

WORKGROUP
REMOTE ACCESS SWITCH
EXAMPLE NETWORKS

Release 7.2

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EXAMPLE NETWORKS

We provide several example networks, beginning with a simple network and progressing to more complex networks. You may find the configuration instructions provided for each example helpful when configuring your own network.

We include the following chapters:

- *Simple Remote Bridging Network*
 An example of a simple network using remote bridge devices to access a CyberSWITCH's four basic rate lines.

- *Remote Bridging Network with Security*
 A bridged network with Calling Line Id security and Bridge MAC Address security enabled. The network is configured with two devices. One device will be configured to require a Bridge MAC Address security password, and one device will not. This network uses BRI lines.

- *IP Routing Network*
 An IP routing network with devices accessing the network from their homes.

- *IP Routing Network with Remote Bridge Devices*
 A smart bridging interface to allow the two remote bridge devices to connect to an IP subnet. The CyberSWITCH treats these devices connected to the Smart Bridging network interface as if they were connected to the same Ethernet segment.

- *IP Routing Network with PPP Devices*
 Uses IP routing to connect two of our products, both using PPP. Each system is on a separate LAN. The configuration for this network is designed to allow three different types of accesses.

- *IPX Routing Network*
 A sample network using IPX protocol to communicate with remote bridges as well as a remote IPX router.

- *AppleTalk Network*
 An AppleTalk network made up of two LANs, separated by the WAN.

SIMPLE REMOTE BRIDGING NETWORK

OVERVIEW

This chapter provides an example of a simple network using remote bridge devices to access four basic rate lines in the CyberSWITCH. Bridges are formed between each of the LANs to which the remote bridge devices are connected, and the LAN to which the CyberSWITCH is connected.

The following section provides the initial installation steps that would be used with any type of network installation.

INITIAL INSTALLATION STEPS

The initial steps in the CyberSWITCH installation process are basically the same no matter how complicated the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe each of these steps in detail.

Worksheets for this network are included on the next few pages.

CONFIGURING THE SIMPLE REMOTE BRIDGE

Because this is a simple bridged network, you only need to fill out the *System Details* and *Bridging and Routing Information* worksheets. The worksheets for Example 1 are on the following pages.

SYSTEM DETAILS

System Name: *SITE1* PAP Password:_____ CHAP Secret:_____

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	*1*	*5ESS*	
Ethernet_1	*2*		

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
Line1	*1*	*1*	*PPP*		*Auto*		
Line2	*1*	*2*	*PPP*		*Auto*		
Line3	*1*	*3*	*PPP*		*Auto*		
Line4	*1*	*4*	*PPP*		*Auto*		

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

V.35 and RS232 Lines

Name	Slot	Port	Device/Network	Idle character

BRIDGING AND ROUTING INFORMATION

BRIDGING

Bridging	***X*** enabled	❒ disabled
Mode of Operation	❒ restricted	❒ unrestricted
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	***X*** enabled	❒ disabled
Mode of Operation	❒ router	***X*** IP host

Network Interface Information

LAN	Name			
	IP address			
	Mask			
Unnumbered WAN	❒ need ❒ don't need			
Remote LAN	Name			
	IP address			
	Mask			
Traditional WAN	Name			
	IP address			
	Mask			
Direct Host WAN	Name			
	IP address	*192.42.1.6*	*192.42.1.7*	
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Destination network address	Mask	Next hop
❒ default?		
❒ default?		
❒ default?		
❒ default?		

CONFIGURE THE CYBERSWITCH

Using CFGEDIT, we will guide you through the steps to configure the CyberSWITCH for a simple remote bridge network. We will execute these steps in the same order as they appear in the configuration menus.

Start the CFGEDIT configuration utility. Type the following command at the system prompt:

cfgedit <return>

The following Main Menu will then be displayed:

```
Main Menu:

   1) Physical Resources
   2) Options
   3) Security
   4) Save Changes

Select function from above or <RET> to exit:
```

CONFIGURING THE PHYSICAL RESOURCE INFORMATION

We start with configuring the Physical Resource information. Press 1 at the Main Menu to display the Physical Resource Configuration Menu:

```
Physical Resource Menu:

   1) Resources
   2) Data Lines
   3) Access
   4) ISDN Subaddress

Select function from above or <RET> for previous menu:
```

You may only configure the switch type. The rest of the resource information may only be displayed.

We will next add the line information. Press 2 at the Physical Resources Menu and press 1 to add a line. First, you will be prompted for the line name. You will then be asked to select which slot and port you wish to use. We will use LINE1 as the line name, and slot 1, port 1 as the slot and port combination:

```
LINE NAME or press <RET> for previous menu: LINE1

Currently available Ports:

SLOT    Resource Type      Available Ports       Switch Type
----   ---------------    -----------------    ---------------
 1    BASIC_RATE          1, 2, 3, 4                BRI_5ESS

Slot number from above? 1

Port number from Slot 1? 1
```

You will then be prompted for the line interface type. For our example, we will be using point-to-point lines. Press 1 as shown below to select this line type.

```
LINE TYPE = BR_ISDN

   1) POINT_TO_POINT
   2) POINT_MULTIPOINT

Select Option [default = POINT_TO_POINT] or press <RET> for previous menu: 1
```

The next item that you need to configure is the Data Link for the line. Depending on the switch type, there may be more than one Data Link per line. In our example, we use one Data Link with Automatic TEI Negotiation:

```
Current DATA LINK Configuration for this line:

id TEI
-- ----

There are currently no Data Links configured for this line.
Enter (1) to Add or press <RET> for previous menu: 1

Automatic TEI Negotiation (Y or N) [default = Y]? Y

Current Data Link Configuration for this line:

id TEI
-- ----
 1 AUTO

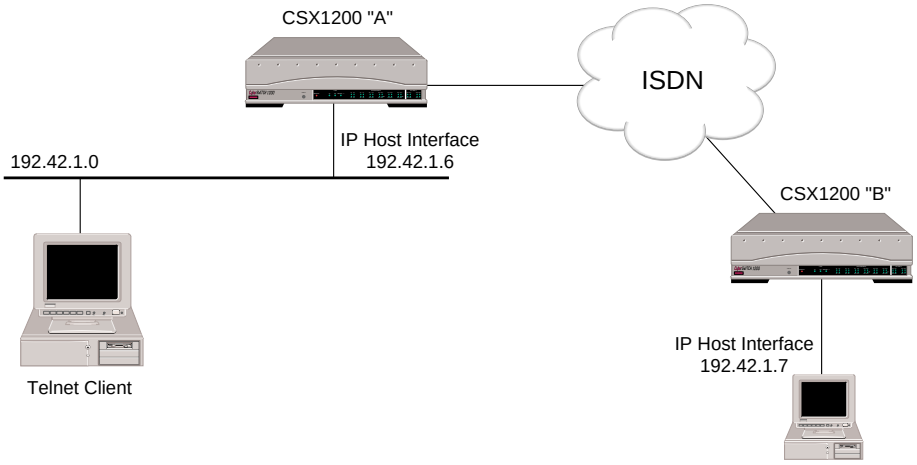
(1) Add, (2) Change, (3) Delete a DATA LINK or press <RET> for previous menu?   <RET>
```

After entering the above information, press <return> to display the line menu. Because there are four lines in this example, the steps for adding a line should be repeated for lines 2, 3, and 4. After all lines have been added, press <return> twice to return to the Main Menu.

CONFIGURING THE OPTIONS

The default configuration for the CyberSWITCH is bridging disabled and IP routing enabled. For reasons we provide below, we want both bridging and IP routing enabled. Under the Option Menu, select the bridging option and follow the instructions to enable bridging.

This network is a bridged network, but we are going to configure an IP option (the IP host operating mode) so that we may use an IP application (such as Telnet, TFTP, or SNMP) to manage the CyberSWITCH. Refer to the graphic below for clarification.



The network illustrated above is a bridged network. Each system, SITE1 and SITE2 have been configured with all the necessary bridging information. SITE1 and SITE2 have also been configured in the IP host operating mode, and each have an IP host interface. This will allow each system to be managed remotely by the PC using Telnet client software (once the initial configuration has been completed).

Note that the IP address associated with each system is on the same LAN as the PC. This *does not* have to be the case. As long as the PC has access to the systems through their IP addresses, it can manage the systems using Telnet (or one of the other IP applications).

The steps below describe the configuration steps needed for the above example:

To enable the IP Host Operating Mode:

1. Select *IP Operating Mode* from the IP configuration menu.

2. Select IP host operating mode.

 Note: The IP operating mode can *not* be set to host unless bridging is enabled.

3. When you select the IP host operating mode, an abbreviated IP configuration will be displayed (similar to the following):

```
IP Menu:

   1)  IP Routing (Enable/Disable)
   2)  IP Operating Mode
   3)  IP Interfaces
   4)  IP Static Routes
   5)  RIP (Enable/Disable)
   6)  IP Static ARP Table Entries
   7)  Isolated Mode (Enable/Disable)
   8)  Static Route Lookup via RADIUS (Enable/Disable)
   9)  IP Address Pool
   10) IP Filter Information
   11) DHCP Information

Select function from above or <RET> for previous menu:
```

To configure the IP host interface:

1. Select *IP Interfaces* from the IP configuration menu.
2. Select to add an interface.
3. Enter the IP address assigned to this interface. For SITE1, this is 192.42.1.6; for SITE2, this is 192.42.1.7.
4. Enter the subnet mask.
5. Enter the MTU size.
6. Select the transmit broadcast address.

 If IP RIP is enabled, enter the following additional information:

7. IP RIP receive control.
8. IP RIP respond control.
9. IP RIP v2 authentication control.
10. IP RIP v2 authentication key (required only if the IP RIP v2 authentication control has been configured with a value other than "No Authentication."

For more detailed information on the IP host operating mode, refer to the *IP Operating Mode* section in the *Configuring Basic IP Routing* chapter of the *User's Guide*.

CONFIGURING THE SECURITY

For this network configuration, we require no security. The default configuration is device security enabled. To make the required configuration change, select *Security* from the Main Menu. Then select *Security Level*. Finally, select *No Security*.

SAVE CONFIGURATION FILES

We have now configured all of the required information. Press 4 from the Main menu to save the changes and then press <RET> to exit. Reboot the system to activate your changes.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed.

On the CyberSWITCH:

- Verify resources are operational
 - Issue *dr* command
 - Look for BRI line messages
 - Look for LAN initialized messages
 - Look for Bridge initialized messages
- Verify WAN Lines Available
 - Connect WAN lines
 - Issue *dr* command
 - Look for "Data Link up 1,1" in reports

On each Combinet LAN:

Attempt accessing a resource on the system LAN. This may require that you reboot your machine and proceed through the logon sequence.

REMOTE BRIDGING NETWORK WITH SECURITY

OVERVIEW

This example network is a bridged network with Calling Line Id security and Bridge MAC Address security enabled. The network is configured with two devices. One device will be configured to require a Bridge MAC Address security password, and one device will not. This network uses BRI lines.

Worksheets for this network are included on the following pages.

Note that a Hunt Group is used for the BRI lines pictured in the Network Topology Worksheet. Remote devices will then only need to configure one telephone number (the Hunt Group number) for the CyberSWITCH instead of all four phone numbers. If the first line is busy, the next line is automatically used, and so on until a free line is found. A Hunt Group number can be arranged through your Service Provider.

INITIAL INSTALLATION STEPS

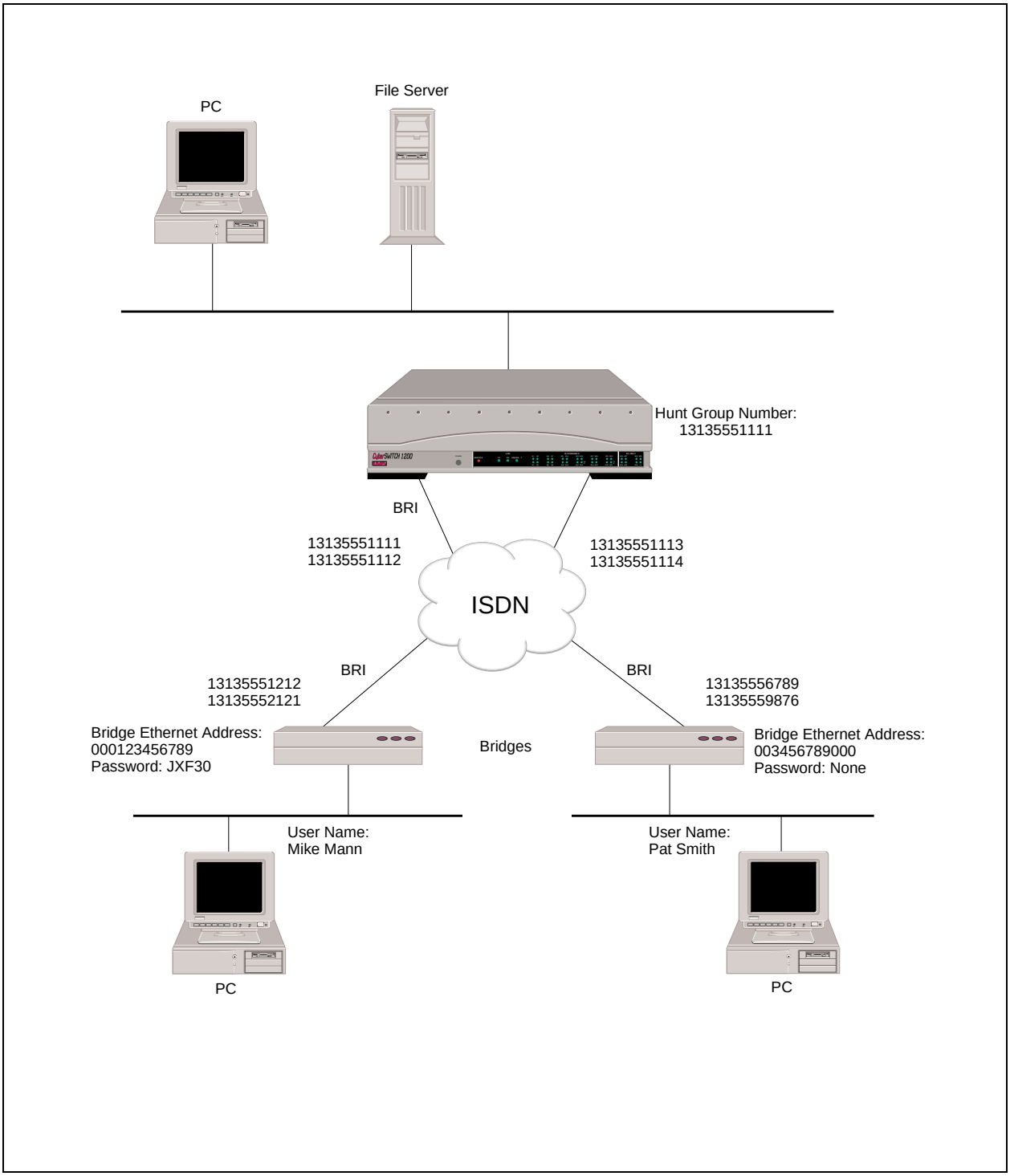
The initial steps in the CyberSWITCH installation process are basically the same no matter how complicated the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe each of these steps in detail.

Worksheets for this network are included on the next few pages.

NETWORK TOPOLOGY



SYSTEM DETAILS

System Name: *Remote Bridge* PAP Password:_____ CHAP Secret:_____

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	*1*	*NI-1*	
Ethernet_1	*2*		

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
Line1	*1*	*1*	*PPP*		*Auto*	*3135551111*	*13135551111**
						3135551112	*13135551112**
Line2	*1*	*2*	*PPP*		*Auto*	*3135551113*	*13135551113**
						3135551114	*13135551114**

** Hunt Group Number: 13135551111*

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

DEVICE INFORMATION

Device Name: *Mike Mann*

Calling (ISDN, FR, etc.) Information

Line Protocol	*HDLC bridge*
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	*000123456789*
Bridge Password*	*JXF30*
CLID(s)	*13135551212*

Frame Relay Information

DLCI	

13135552121

* HDLC Bridge only

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	❒ enabled ❒ disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *Pat Smith*

Calling (ISDN, FR, etc.) Information

Line Protocol	*HDLC bridge*
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	*003456789000*
Bridge Password*	
CLID(s)	*13135556789*

Frame Relay Information

DLCI	

13135559876

* HDLC Bridge only

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	❒ enabled ❒ disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

BRIDGING AND ROUTING INFORMATION

BRIDGING

Bridging	***X*** enabled ❒ disabled	
Mode of Operation	❒ restricted ❒ unrestricted	
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	***X*** enabled ❒ disabled
Mode of Operation	❒ router ❒ IP host

Network Interface Information

LAN	Name			
	IP address			
	Mask			
Unnumbered WAN	❒ need ❒ don't need			
Remote LAN	Name			
	IP address			
	Mask			
Traditional WAN	Name			
	IP address			
	Mask			
Direct Host WAN	Name			
	IP address			
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Destination network address	Mask	Next hop
❒ default?		
❒ default?		
❒ default?		
❒ default?		

CONFIGURE THE CYBERSWITCH

Note: We are assuming that the software has already been installed and is running. Be sure you are working from the system prompt.

Using the detailed instructions for these steps found in the *Simple Remote Bridging* chapter, complete the following configuration steps.

Start the Run-Time CFGEDIT program

Select physical resources
Select to add a resource
 Select Switch type to be NI-1
Select to add a line
 Enter the line name
 Select slot and port numbers
 Select line interface type of "Point-to-Point"
 Add Data Links (Data Link explanation follows)
 Choose Auto TEI Negotiation
 Enter Service Profile ID (SPID) Value
 Enter Directory Number for Data Link
 Enter Maximum Number of Digits to Verify
 Repeat "Add Data Links" for second Data Link
 Repeat "Select to add a line" for each additional line

Data links are handled differently on a NI-1 switch. Some BRI lines have only one phone number (for the Data Link), but can handle two calls (one for each bearer channel). For NI-1 switches, the BRI line has two phone numbers (one for each bearer channel), and each phone number has its own SPID. You must enter the number of digits to verify, so that when the system receives a phone call it can determine on which bearer to accept the phone call. Refer to the System Details worksheet for the SPIDs, directory numbers, and the number of digits to verify.

CONFIGURING THE OPTIONS

The default configuration for the CyberSWITCH is bridging disabled and IP routing enabled. For reasons we provide below, we want both bridging and IP routing enabled. Under the Option Menu, select the bridging option and follow the instructions to enable bridging.

This network is a bridged network, but we are going to configure an IP option (the IP host operating mode) so that we may use an IP application (such as Telnet, TFTP, or SNMP) to manage the CyberSWITCH. This process was described in the previous chapter (page 13) and will not be repeated here.

CONFIGURING THE SECURITY

This network has remote devices, and the device information for each of those devices must be configured. Device security is used, and the remote devices are configured in the on-node

authentication database. Device security using a on-node authentication database are the default values.

To begin the security configuration, press 3 at the Main CFGEDIT Menu. The Security Menu will then be displayed as follows:

```
Security Menu:

   1) Security Level
   2) System Options and Information
   3) Device Level Databases
   4) User Level Databases (Enable/Disable)
   5) Off-node Server Information
   6) Network Login Information

Select function from above or <RET> for previous menu:
```

CONFIGURING THE SECURITY LEVEL

From the Security Menu, press 1, Security Level. Then press 2 to enable Device Level Security:

```
Security Level Menu:

   1) No Security
   2) Device Level Security
   3) User Level Security
   4) Device and User Level Security

Select function from above or <RET> for previous menu:
```

After enabling Device Level Security, return to the Security Menu.

CONFIGURING THE SYSTEM OPTIONS AND INFORMATION

The default configuration for System Options is all security options enabled, which is acceptable for this network. No System Information or Administration Sessions are required. Therefore, no changes are necessary.

CONFIGURING THE DEVICE LEVEL DATABASE

From the Security Menu, press 3 to display the Device Level Database Menu. To enable the On-node Device Database, press 1 and follow the on-screen instructions:

```
Device Level Databases Menu:

   1) On-node Device Database (Enable/Disable)
   2) On-node Device Entries
   3) Off-node Device Database Location

Select function from above or <RET> for previous menu:
```

Press 2 to configure the information for our first device, Mike Mann. Press 1 to add a device. You will first be asked to enter the Device Name:

```
Device Name? Mike Mann
```

After the new device name has been specified, a screen similar to the following is displayed.

```
Device Table Menu: (Device = "Mike Mann")

   1)  ISDN
   2)  Frame Relay
   3)  X.25
   4)  Authentication
   5)  IP
   6)  IPX
   7)  AppleTalk
   8)  Bridging
   9)  Compression

Select function from above or <RET> for previous menu:
```

Information for the new device may be configured in any order. You have control over how much information is specified for each device, and the order in which it is entered.

We will begin by specifying the type of device. We need to determine if the device will use ISDN Line Protocol (choice 1), Frame Relay (choice 2), or X.25 (choice 3).This device is an ISDN device, so we will press 1 for “ISDN Information” from the Device Table Configuration Menu.

The ISDN Configuration Menu will then be displayed with the preconfigured default values:

```
Device ISDN Menu: (Device = "Mike Mann")

   1) ISDN Line Protocol        "PPP (Point to Point Protocol)"
   2) Base Data Rate            "64000 bps"
   3) Initial Data Rate         "64000 bps"
   4) Maximum Data Rate         "128000 bps"
   5) Dial Out Phone Number(s)  ""
   6) Subaddress                ""
   7) Profile Name              "Default_Profile"
   8) H0 Call Support           ENABLED

Select function from above or <RET> for previous menu:
```

We do not want to use the default ISDN Line Protocol of PPP. Press 1 to configure this device’s ISDN line protocol. The device Mike Mann uses HDLC protocol, so we will press 2:

```
Device ISDN Line Protocol Menu: (Device = "Mike Mann")

   1) PPP (Point to Point Protocol)
   2) HDLC Bridge
   3) IP Host (RFC1294)

Select option to associate with device "Mike Mann",
 or "0" to disable ISDN access for this device [default = 1]? 2
```

The only other item on the Device ISDN Line Protocol Menu that this type of device needs is the maximum data rate. We will accept the default value of 128,000 bps. No changes are required. Return to the Device Table Menu.

At the Device Table Menu, press 4 to enter the authentication information needed for this device. The authentication information needed for each device depends on the device type.

For device "Mike Mann," we opt to configure a bridge Ethernet address (000123456789), we will assign a bridge password (JXF30), and configure a first and second calling line Id. After the device authentication has been entered for device "Mike Mann," the screen will appear as follows:

```
Device Authentication Menu: (Device = "Mike Mann")

PPP:
   1) PAP Password                "
   2) CHAP Secret                 "
   3) Outbound Authentication     ENABLED
   4) User Level Authentication   DISABLED

IP Host (RFC 1294):
   5) IP Host Id                  "

HDLC Bridge:
   6) Bridge Ethernet Address     "000123456789"
   7) Bridge Password             "JXF30"

ISDN:
   8) Calling Line Id(s)          "13135551212"
                                  "13135552121"

Select function from above or <RET> for previous menu:
```

Next, enter the device information for Pat Smith. This device is also an HDLC bridge, and is configured using the same type of authentication as device Mike Mann, except we will configure no password for device Pat Smith. Enter 003456789000 for the bridge Ethernet address, 13135556789 for the first calling line Id, and 13135559876 for the second calling line Id.

The following screen will be displayed after information for both devices in our network has been entered:

```
CURRENT DEVICE TABLE (Sorted by Device Name in Ascending ASCII Order)

id     Device Name
----------------------------
1      "Mike Mann"
2      "Pat Smith"

(1) Add, (2) Change, (3) Delete, (4) Display a Device or press <RET> for previous menu?
```

SAVE CONFIGURATION FILES

We have now configured all of the required information for a bridged system with Calling Line Id Security and Bridge MAC Address Security enabled. Press 4 at the Main menu to save the changes. The old configuration files will be stored in the \CONFIG directory with a file extension of .BAK (e.g., the old NODE.NEI file will be called NODE.BAK).

After you save the configuration files, press <RET> to exit the CFGEDIT program. Reboot the system to activate your changes.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed.

On the CyberSWITCH:

- Verify hardware resources are operational
 - Issue *dr* command
 - Look for BRI line messages
 - Look for LAN initialized messages
- Verify WAN Lines Available
 - Connect WAN lines
 - Issue *dr* command
 - Look for "Data Link up 1,1" in reports

On each HDLC Bridge LAN:

- Attempt accessing a resource on the CyberSWITCH LAN. This may require that you reboot your system and proceed through the logon sequence.

IP ROUTING NETWORK

OVERVIEW

This sample network has an IP network with devices accessing the network from their homes.

INITIAL INSTALLATION STEPS

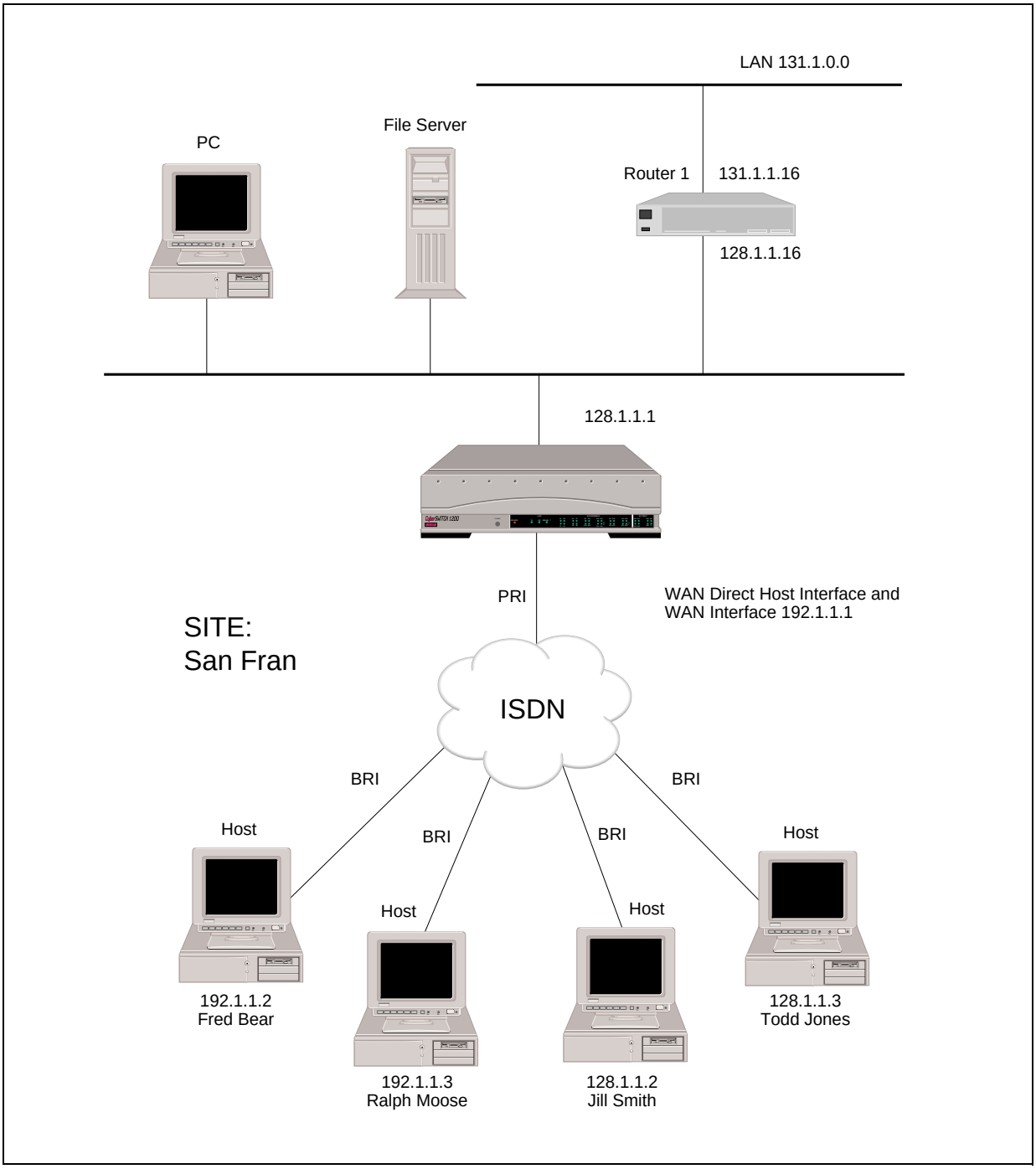
The initial steps in the CyberSWITCH installation process are basically the same no matter how complicated the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe these steps in detail.

Worksheets for this network are included on the next few pages.

NETWORK TOPOLOGY



SYSTEM DETAILS

System Name: *IP Network* PAP Password:_____ CHAP Secret:_____

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	*1*	NTT	
Ethernet_1	*3*		

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
line1	*1*	*1*			*Auto*		

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

DEVICE INFORMATION

Device Name: *Rick Bear*

Calling (ISDN, FR, etc.) Information

Line Protocol	
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	*RICK*
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	***X*** enabled ❒ disabled
IP Address (on WAN link)	*192.1.1.2* ❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *Jill Smith*

Calling (ISDN, FR, etc.) Information

Line Protocol	
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	*JILL*
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	***X*** enabled ❒ disabled
IP Address (on WAN link)	*128.1.1.2* ❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *Ralph Moose*

Calling (ISDN, FR, etc.) Information

Line Protocol	
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	*RALPH*
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	***X*** enabled ❒ disabled
IP Address (on WAN link)	*192.1.1.23* ❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *Todd Jones*

Calling (ISDN, FR, etc.) Information

Line Protocol	
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	*TODD*
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	***X*** enabled ❒ disabled
IP Address (on WAN link)	*128.1.1.3* ❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

BRIDGING AND ROUTING INFORMATION

BRIDGING

Bridging	❒ enabled ❒ disabled	
Mode of Operation	❒ restricted ❒ unrestricted	
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	***X*** enabled ❒ disabled	
Mode of Operation	***X*** router ❒ IP host	

Network Interface Information

LAN	Name	*SanFran*		
	IP address	*128.1.1.1*		
	Mask			
Unnumbered WAN	❒ need ❒ don't need			
Remote LAN	Name			
	IP address			
	Mask			
Traditional WAN	Name	*SanJose*		
	IP address	*192.1.1.1*		
	Mask			
Direct Host WAN	Name	*Monterey*		
	IP address	*(unnumbered)*		
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Destination network address	Mask	Next hop
❒ default?		
❒ default?		
❒ default?		
❒ default?		

CONFIGURE THE CYBERSWITCH

Note: The software should have already been installed and you should see the system prompt before proceeding with these steps.

Using the detailed instructions for these steps found in the *Simple Remote Bridging* chapter, complete the following configuration steps.

Start the CFGEDIT program

Select physical resources
Select to add a resource
 Select Switch type to be 4ESS
Select to add a line
 Enter “Line1” as the line name
 Select slot 1, port 1
 Add Data Links
 Choose Auto TEI Negotiation
 Enter SPID Value
 Enter Directory Number for Data Link
 Enter Maximum Number of Digits to Verify
 Repeat “Add Data Links” for second Data Link
 Repeat “Select to add a line” for each additional line

The following sections provide instructions for completing the remaining configuration steps.

CONFIGURING THE CYBERSWITCH OPTIONS

To begin the configuration of the system options, press 2 at the Main Menu. The following options menu will then be displayed:

```
Options Menu:

   1)  Bridging
   2)  IP
   3)  IPX Routing
   4)  AppleTalk
   5)  SNMP
   6)  PPP
   7)  Call Control Options
   8)  Default Line Protocol
   9)  Log Options
   10) Compression

Select function from above or <RET> for previous menu:
```

For this example, we only need IP routing enabled. IP routing is already enabled as fault, so no change is necessary.

For this example, the only other IP information we need to configure is for IP interfaces. No static routes are needed because Router 1 supports RIP, which eliminates the need to manually configure a static route. The next section will provide the instructions needed to configure the necessary IP interfaces.

CONFIGURING THE IP INTERFACE INFORMATION

In our example, we need to configure three types of interfaces (refer to the Network Topology Worksheet). The LAN type network interface represents the system connection to the IP Network 128.1.0.0 on the LAN. The WAN (Direct Host) interface is a logical extension of the LAN IP network. Direct Host remote IP devices share the same IP address space as the IP network 128.1.0.0 on the LAN. The WAN network interface is a logical interface to an IP network connected to the CyberSWITCH over the ISDN. The reason we are using both a WAN and a WAN (Direct Host) Interface is to allow the two devices, Rick Bear and Ralph Moose, to call into somewhere else if need be.

We will begin by adding the LAN interface. Press 2 at the IP configuration menu to begin the LAN interface configuration. Press 1 to add an IP interface. Press 1 to select LAN as the type of interface that you wish to configure.

The interface name is a symbolic name given to the interface. For the LAN interface, you should use a name that describes the LAN. It could be the name of the site or department. Type SanFran for this example.

You will then be asked for the IP Address for the interface. In our example, the value you should enter is 128.1.1.1. You will then be asked for the IP Subnet mask information. In our example, we are using a Class B address (without any subnetwork addressing) that requires 16 bits of the address to define the network number. Therefore, press <return> to accept the default of “16” significant bits. Press <return> to accept the default packet encapsulation type (Ethernet). Press <return> to accept the default of 1500 as the MTU size.

Press <return> to accept the default transmit broadcast address. For almost all devices, this address will let the broadcast be transmitted to all devices on the local network. For some older devices, you may need to try some of the other selections to get the transmission to work correctly.

The rest of the LAN information requested pertains to the system RIP feature. (This information will not be asked for if you have disabled RIP.) RIP is a protocol used to exchange routing information among IP devices. Using RIP can automate the maintenance of routing tables on IP devices and relieve you of having to keep the routing tables up to date manually. Static routes need to be configured manually if we need to access a WAN network that is not directly connected to the system, or if we need to access a LAN network through a router that does not support RIP.

RIP determines the shortest path between two points in a network in terms of the number of “hops” between these points.

For the rest of the required RIP LAN interface information, accept the default values.

The interactive LAN interface session should be similar to the following:

```
   1) LAN
   2) WAN
   3) WAN (Direct Host)
   4) WAN (RLAN)
   5) WAN (UnNumbered)

Select function from above or <RET> for previous menu: 1

INTERFACE NAME or <RET> to cancel? SanFran

Enter the IP Address in dotted decimal notation
or <RET> to cancel? 128.1.1.1

Enter the number of significant bits for the Subnet Mask
[default = 16]?    <RET>

Enter the packet encapsulation type 1) for ETHERNET 2) for SNAP
[default = ETHERNET]?   <RET>

Enter the MTU size in bytes [default = 1500]?   <RET>

Transmit Broadcast Address:
   1) 128.1.255.255
   2) 128.1.0.0
   3) 255.255.255.255
   4) 0.0.0.0
   5) Specify Explicitly

Enter a Transmit Broadcast Address from the above menu [default = 1]? <RET>

RIP Send Control:
   1) Do Not Send.
   2) RIP Version 1.
   3) RIP Version 1 Compatibility.
   4) RIP Version 2.

Enter a RIP Send Control from the above menu [default = 2]?   <RET>
(
RIP Receive Control:
   1) Do Not Receive.
   2) RIP Version 1 Only.
   3) RIP Version 2 Only.
   4) RIP Version 1 or Version 2.

Enter a RIP Receive Control from the above menu [default = 4]? <RET>

RIP Respond Control:
   1) Do Not Respond.
   2) RIP Version 1 Only.
   3) RIP Version 2 Only.
   4) RIP Version 1 or Version 2.

Enter a RIP Respond Control from the above menu [default = 4]? <RET>

RIP Version 2 Authentication Control:
   1) No Authentication.
   2) Simple Password.

Enter a RIP Authentication Control from the above menu [default = 1]? <RET>
```

After you have entered all of the information for the interface, a summary screen is displayed. You are asked if you want to save this information. If all of the configured information is accurate, press <return> to save the information. If any configuration elements need to be changed, press N, and reconfigure the interface.

```
Current Configuration for INTERFACE "sanfran":

Interface Type             LAN
IP Address                 128.1.1.1
Mask                       255.255.0.0
MTU (bytes)                1500
Encapsulation              Ethernet
LAN Port                   1
Transmit Broadcast         128.1.255.255
RIP Configuration:
 Send Control              RIP Version 1
 Receive Control           RIP1 or RIP2
 Respond Control           RIP1 or RIP2
 v2 Authentication         No Authentication


Are you sure you want to add the INTERFACE "sanfran" (Y or N) [Y]? <RET>
```

Next, we will configure the system's WAN interface. This interface is used for the two devices Rick Bear and Ralph Moose. The interface name is a symbolic name given to the interface. For the WAN interface, you should use a name that describes the WAN. For this example, both WAN sites are located in San Jose, so we will enter SanJose for the WAN interface Name.

You will then be asked for the IP Address for the WAN interface. In our example, the value you should enter is 192.1.1.1 (refer to Network Topology Worksheet). You will then be asked for the IP Subnet mask information. Press <return> to accept the default of "24" significant bits. Press <return> to accept the default of 1500 as the MTU size. Press <return> to accept the default transmit broadcast address.

The last configuration element pertains to the system's RIP feature. This information will not be requested if you have disabled the RIP feature. Here, you have a choice of enabling or disabling host routes propagation. The RIP host routes propagation scheme determines how the WAN local route will be propagated via RIP. The default value is "Host Routes Propagation is currently DISABLED." With the default, WAN local routes are propagated as subnetwork routes. If Host routes propagation is enabled, host routes will be propagated on other network interfaces only while each remote IP device is connected to the system.

When the RIP host propagation scheme is enabled, multiple systems on the same LAN will work properly. RIP information is then advertised as multiple host routes as they connect to the system. In our example network, there is only one system on the LAN. Therefore, we want to leave host routes propagation disabled.

The following screen illustrates the host routes propagation portion of the entry of the WAN interface information:

```
Host Routes Propagation is currently DISABLED.

By enabling Host Route Propagation for this interface,
host routes will be propagated on other network interfaces
while each remote IP device is connected to the system.

Do you wish to ENABLE Host Route Propagation (Y or N) [default = N]? <RET>
```

The WAN interface summary screen will then be displayed. If all of the configured information is accurate, press <return> to save the information.

Finally, we will enter the interface information for the WAN (Direct Host) interface. Press 1 to add another interface. This interface will be used for devices Jill Smith and Todd Jones. The interface name is a symbolic name given to the interface. For the WAN (Direct Host) interface, you should use a name that describes the Direct Host WAN. For this example, both Direct Host WAN sites are located in Monterey, so we will enter Monterey for the interface Name.

You will also need to enter an MTU value. Press <return> to accept the default of 1500. If all of the configured information is accurate, press <return> to save the information.

After all three interfaces have been configured, the following screen will be displayed:

```
Current INTERFACE Configuration:

id Name           Type                    IP address     Mask
-- -------------- ---------------------- ------------- ---------------
1 sanfran          LAN                     128.1.1.1     255.255.0.0
2 sanjose          WAN                     192.1.1.1     255.255.255.0
3 monterey         WAN (Direct Host)       UnNumbered    (128.1.1.1)

(1) Add, (2) Change, (3) Delete, (4) Display a INTERFACE or press <RET> for previous menu?
```

We have now completed the IP information required for this example. Return to the Main Menu.

CONFIGURING THE SECURITY

This example has remote devices, and the device information for each of those devices must be configured. Device security is used, and the remote devices are configured in the on-node authentication database. Device security using a on-node authentication database are the default values.

To begin the security configuration, press 3 at the Main CFGEDIT Menu to display the Security Menu. The sections below provide instructions for configuring the needed security information.

CONFIGURING THE SECURITY LEVEL

To begin, press 1 at the Security Menu to display the Security Level Menu. To enable Device level Security, press 2.

CONFIGURING THE SYSTEM OPTIONS AND INFORMATION

The default configuration for System Options is all security options enabled, which is acceptable for this network. No System Information or Administration Sessions are required. Therefore, no changes are necessary.

CONFIGURING THE DEVICE LEVEL DATABASE

Before beginning, note the following:

The Device Name is the symbolic name for the Device. The Host Id is the information that will be exchanged when the call is received to ensure only the proper Devices gain access to the system. The IP Address is simply the IP Address for the device. The IP address must have a valid IP network interface defined for it.

Press 3 at the Security Menu to display the Device Level Database Menu. To enable the On-node Device Database, press 1 and follow the on-screen instructions.

To add the remote devices, press 2 (*On-node Device Database entries*). Press 1 to configure the information for our first device, Rick Bear:

```
Device Name? Rick Bear
```

After the new device name has been specified, a screen similar to the following is displayed. Select 1, ISDN:

```
Device Table Menu: (Device = "Rick Bear")

   1)  ISDN
   2)  Frame Relay
   3)  X.25
   4)  Authentication
   5)  IP
   6)  IPX
   7)  AppleTalk
   8)  Bridging
   9)  Compression

Select function from above or <RET> for previous menu:  1
```

The ISDN Configuration Menu then displays preconfigured default values:

```
Device ISDN Menu: (Device = "Rick Bear")

   1) ISDN Line Protocol.       "PPP (Point to Point Protocol)"
   2) Base Data Rate.           "64000 bps"
   3) Initial Data Rate.        "64000 bps"
   4) Maximum Data Rate.        "128000 bps"
   5) Dial Out Phone Number(s). ""
   6) Subaddress.               ""
   7) Profile Name.             "Default_Profile"
   8) H0 Call Support           DISABLED

Select function from above or <RET> for previous menu:
```

We do not want to use the default ISDN Line Protocol of PPP. Press 1 to configure this device's ISDN line protocol. The device Rick Bear uses RFC 1294 protocol, so we will press 3:

```
Device ISDN Line Protocol Menu: (Device = "Rick Bear")

   1) PPP (Point to Point Protocol)
   2) HDLC Bridge
   3) IP Host (RFC1294)

Select option to associate with device "Rick Bear",
or "0" to disable ISDN access for this device [default = 1]? 3
```

The only other item on the Device ISDN Line Protocol Menu that this type of device needs is the maximum data rate. We will accept the default value of 128,000 bps. No changes are required. Return to the Device Table Menu.

From the Device Table Menu, press 4 to specify Authentication Information:

```
Device Authentication Menu: (Device = "Rick Bear")

PPP:
   1) PAP Password                 ""
   2) CHAP Secret                  ""
   3) Outbound Authentication      ENABLED
   4) User Level Authentication    DISABLED

IP Host (RFC 1294):
   5) IP Host Id                   ""

HDLC Bridge:
   6) Bridge Ethernet Address      ""
   7) Bridge Password              ""

ISDN:
   8) Calling Line Id(s)           ""

Select function from above or <RET> for previous menu:
```

Since “Rick Bear” is an IP Host Device, you must specify an IP Host Id. Press 5. The following screen is displayed:

```
IP Host Id [default = NONE]? RICK
```

“RICK” is the IP Host Id in our example.

At this point, we now need to specify the IP address for “Rick Bear”. Return to the Device Table Menu and press 5, *IP*. Enter Rick’s IP address of 192.1.1.2 at the displayed screen:

```
IP Address in dotted decimal notation or 0.0.0.0 if the device is
over an unnumbered link [default = NONE]?   192.1.1.2
```

Configuration is now complete for device “Rick Bear.” Following this example, complete the entry of information for all remaining devices.

The following screen will be displayed after all four devices in our example have been entered:

```
Current Device Table (Sorted by Device Name in Ascending ASCII Order)

id     DEVICE NAME
----------------------------
1      "Jill Smith"
2      "Rick Bear"
3      "Todd Jones"
4      "Ralph Moose"

(1) Add, (2) Change, (3) Delete, (4) Display a Device or press <RET> for previous
menu?
```

Return to the Security Configuration Menu.

CONFIGURING THE USER LEVEL DATABASES

This network doesn't require the use of a user level database. Therefore, no changes are necessary.

CONFIGURING THE OFF-NODE SERVER INFORMATION

The default configuration for Off-node Server Information is None (Use On-node). Since this network doesn't require the use of an off-node server, no changes are necessary.

CONFIGURING THE NETWORK LOGIN INFORMATION

This network doesn't require the use of a user level database so network login information configuration is not necessary.

SAVE CONFIGURATION FILES

We have now configured all the required information for this example. Press 4 from the Main menu to save the changes. The old configuration files will be stored in the \CONFIG directory with a file extension of .BAK (e.g., the old NODE.NEI file will be called NODE.BAK).

After you save the configuration files, press <RET> to exit the CFGEDIT program. Reboot the system to activate your changes.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed for Example 3.

On the CyberSWITCH:

Verify hardware resources are operational
- Issue *dr* command
- Look for BRI line messages
- Look for LAN initialized messages
- Check for IP routing initialized message in log

Verify WAN Lines Available
- Connect WAN lines
- Issue *dr* command
- Look for "Data Link up 1,1" in reports

On each Remote Host:

- Attempt to access a resource on the CyberSWITCH LAN. This may require that you reboot your system and proceed through the logon sequence.
- Have the remote hosts ping the CyberSWITCH.
- Have the CyberSWITCH ping the remote hosts (if a connection is up).

IP ROUTING NETWORK WITH REMOTE BRIDGE DEVICES

OVERVIEW

This sample network has two remote satellite offices in Monterey and Carmel, California, that need to be in daily electronic communication with their Corporate Office. Each satellite office has an IP Host that communicates through a remote bridge using the CyberSWITCH's WAN Remote LAN (RLAN) interface. The CyberSWITCH treats these devices connected to the RLAN network interface as if they were connected to the same Ethernet segment. We will assume in this network that we only want to route IP traffic onto the corporate LAN, but the same network could be built to route IPX traffic.

BUSINESS ASSUMPTIONS

- All devices are PPP-compliant.
- Corporate Office (central site) is on a PBX; therefore, *9* required to dial out.
- No File Servers at Carmel or Monterey sites.
- Uses the On-node Device Database for authentication database.
- Uses PAP to authenticate remotes; CHAP on central site.
- Carmel and Monterey dial into Corporate Office.
- Corporate Office supports two BRI lines (4-port BRI card), with NTT custom switch configuration.
- Assumes we want to route IP traffic onto the corporate LAN.

INITIAL INSTALLATION STEPS

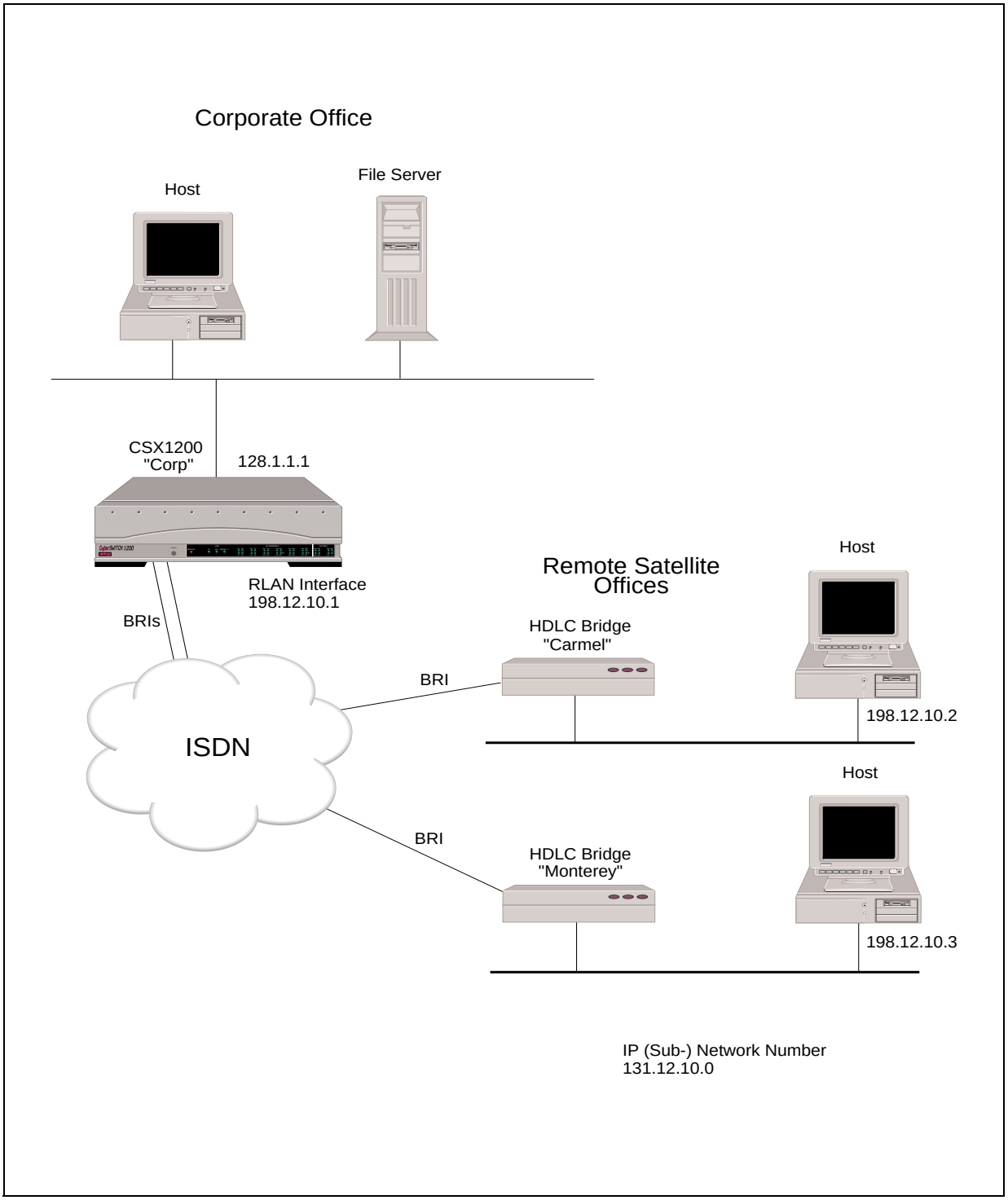
The initial steps in the CyberSWITCH installation process are basically the same no matter how complicated the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe each of these steps in detail.

Worksheets for this network are included on the next few pages.

NETWORK TOPOLOGY



SYSTEM DETAILS

System Name: *Corp* PAP Password:_____ CHAP Secret:_____

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	*1*	*NTT*	
Ethernet_1	*2*		

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
line1	*1*	*1*			*Auto*		
line2	*1*	*2*			*Auto*		

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

DEVICE INFORMATION

Device Name: *Monterey*

Calling (ISDN, FR, etc.) Information

Line Protocol	*HDLC Bridge*
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	*123123123123*
Bridge Password*	*q3bay*
CLID(s)	

Frame Relay Information

DLCI	

* HDLC Bridge only

Protocol for this particular device?

Bridge

Bridging enabled?	***X*** enabled ❒ disabled
Make calls for bridged data?	❒ enabled ***X*** disabled
For IP RLAN, IP (Sub-) network number	*198.12.10.0*
For IPX RLAN, external network number	

IP

IP enabled?	❒ enabled ***X*** disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *Carmel*

Calling (ISDN, FR, etc.) Information

Line Protocol	*HDLC Bridge*
Base Data Rate	
Initial Data Rate	
Max Data Rate	
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	*222222222222*
Bridge Password*	*dharry*
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	***X*** enabled ❒ disabled
Make calls for bridged data?	❒ enabled ***X*** disabled
For IP RLAN, IP (Sub-) network number	*198.12.10.0*
For IPX RLAN, external network number	

IP

IP enabled?	❒ enabled ***X*** disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

BRIDGING AND ROUTING INFORMATION

BRIDGING

Bridging	❒ enabled	***X*** disabled
Mode of Operation	❒ restricted	❒ unrestricted
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	***X*** enabled	❒ disabled
Mode of Operation	***X*** router	❒ IP host

Network Interface Information

LAN	Name	*CorpOffice*		
	IP address	*128.1.1.1*		
	Mask	*255.255.0.0*		
Unnumbered WAN	❒ need ❒ don't need			
Remote LAN	Name	*Satellites*		
	IP address	*198.12.10.1*		
	Mask	*255.255.255.0*		
Traditional WAN	Name			
	IP address			
	Mask			
Direct Host WAN	Name			
	IP address			
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Destination network address	Mask	Next hop
❒ default?		
❒ default?		
❒ default?		
❒ default?		

CONFIGURE THE CYBERSWITCH

Using the detailed instructions found in the *Simple Remote Bridging* chapter, complete the configuration steps listed below.

Note: The software should have already been installed and the system prompt should be displayed before beginning the configuration.

Start the CFGEDIT program

Select physical resources
Select to add a resource
 Select Switch type to be NI-1
Select to add a line
 Select slot 1, port 1
 Enter “Line1” as the line name
 Add Data Links
 Choose Auto TEI Negotiation
 Enter SPID Value
 Enter Directory Number for Data Link
 Enter Maximum Number of Digits to Verify
 Repeat “Add Data Links” for second Data Link
 Repeat “Select to add a line” for each additional line

The following sections provide instructions for completing the remaining configuration steps.

CONFIGURING THE CYBERSWITCH OPTIONS

To begin the configuration of the system options, press 2 at the Main Menu. The options menu will then be displayed.

ENABLE/DISABLE BRIDGING

Whether or not to use bridging depends on network requirements. The RLAN interface will work either way. For this example, we will assume that we only want to route IP traffic onto the corporate LAN. Therefore, we will disable bridging on the CyberSWITCH. IP routing is already enabled as fault, so no change is necessary.

For this example, the only other IP information we need to configure is two IP interfaces. (No static routes are needed.) The next section will provide the instructions needed to configure the necessary IP interfaces.

CONFIGURING THE IP INTERFACE INFORMATION

In our example, we need to configure two types of interfaces. The LAN interface represents the system connection to the LAN IP Network 128.1.0.0. The WAN RLAN interface represents the system connection to the remote IP network 198.12.10.0.

Press 2 at the IP main menu to begin the configuration of the IP interface information. Press 1 to add an IP interface. Select the LAN interface option from the list of possible interface types.

The interface name is a symbolic name given to the interface. For the LAN interface, use a name that describes the LAN, such as the name of the site or department. Type *CorpOffice* for this example.

You will then be asked for the IP address for the interface. In our example, the value you should enter is 128.1.1.1. You will then be asked for the IP subnet mask information. In our example, we are using a Class B address (without any subnetwork addressing) that requires 16 bits of the address to define the network number. Press <return> to accept the default of "16" significant bits. Press <return> to accept the default packet encapsulation type (Ethernet). Press <return> to accept the default of 1500 as the MTU size.

Press <return> to accept the default transmit broadcast address. For almost all devices, this address will allow the transmission of the broadcast to all devices on the local network. For some older devices, you may need to try some of the other selections to get the transmission to work correctly.

The rest of the LAN information requested pertains to the system's RIP capability on the LAN (if RIP is enabled). For the rest of the required RIP LAN interface information, accept the default values. If RIP is disabled, no RIP prompts will be displayed.

The sequence of prompts will be similar to the following:

```
   1) LAN
   2) WAN
   3) WAN (Direct Host)
   4) WAN (RLAN)
   5) WAN (UnNumbered)

Select Option or press <RET> for previous menu: 1

INTERFACE NAME or <RET> to cancel? CorpOffice

Enter the IP Address in dotted decimal notation
or <RET> to cancel? 128.1.1.1

Enter the number of significant bits for the Subnet Mask
[default = 16]?   <RET>

Enter the packet encapsulation type 1) for ETHERNET 2) for SNAP
[default = ETHERNET]? <RET>

Enter the MTU size in bytes [default = 1500]? <RET>

Transmit Broadcast Address:
   1) 128.1.255.255
   2) 128.1.0.0
   3) 255.255.255.255
   4) 0.0.0.0
   5) Specify Explicitly
Enter a Transmit Broadcast Address [default = 1]: <RET>

RIP Send Control:
   1) Do Not Send.
   2) RIP Version 1.
   3) RIP Version 1 Compatibility.
   4) RIP Version 2.

Enter RIP Send Control [default = 2]: <RET>

RIP Receive Control:
   1) Do Not Receive.
   2) RIP Version 1 Only.
   3) RIP Version 2 Only.
   4) RIP Version 1 or Version 2.

Enter RIP Receive Control [default = 4]: <RET>

RIP Respond Control:
   1) Do Not Respond.
   2) RIP Version 1 Only.
   3) RIP Version 2 Only.
   4) RIP Version 1 or Version 2.

Enter RIP Respond Control [default = 4]: <RET>

RIP Version 2 Authentication Control:
   1) No Authentication.
   2) Simple Password.

Enter a RIP Authentication Control [default = 1]: <RET>
```

You will then be prompted to verify your input. Make changes if necessary, or, if original input correct, continue with configuration for RLAN interface.

Press 1 to add the next interface. Configure the information for the WAN (RLAN) interface as follows:

The interface name is a symbolic name given to the interface. For the WAN (RLAN) interface, you should use a name that describes this interface. Type *Satellites* for this example.

You will then be asked for the IP address for the interface. In our example, the value you should enter is 198.12.10.1. You will then be asked for the IP subnet mask value. In our example, we are using a Class C address (without any subnetwork addressing) that requires 24 bits of the address to define the network number. Therefore, press <return> to accept the default of "24" significant bits. Press <return> to accept the default packet encapsulation type (Ethernet). Press <return> to accept the default of 1500 as the MTU size. Press <return> to accept the default transmit broadcast address.

The rest of the RLAN interface information requested pertains to the Proxy ARP and, if you have not disabled RIP, the RIP feature. Accept all of the default values, or modify as needed.

The following screen will summarize the configured interfaces:

```
Current INTERFACES:

id Name                Type                    IP address       Mask
-- ----------------- ---------------------- --------------- ---------------
1   corpoffice       LAN                     128.1.1.1        255.255.0.0
2   satellites       WAN (RLAN)              198.12.10.1      255.255.255.0

(1) Add, (2) Change, (3) Delete, (4) Display a INTERFACE or press <RET> for previous
menu?
```

Return to the Main Menu.

CONFIGURING THE SECURITY

This example has two remote devices, and the device information for each of those devices must be configured. Device security is used, and the remote devices are configured in the on-node authentication database. Device security using an on-node authentication database are the default values.

Before beginning, note the following:

This is a system configuration using IP Routing and Bridge MAC Address Security. We will disable IP routing so that the system will recognize particular devices as a remote bridges. When configuring device-level bridging information for each remote bridge, we will provide the following elements: Device Name, Device Type, Bridge Ethernet Address and associated password, and the IP (Sub-) Network Number of the remote LAN.

Note that there may be multiple remote bridges and LAN segments on the subnetwork 198.12.10.0. (Our example includes two.) When using the RLAN interface, you are only required to enter the subnetwork address of the IP network when configuring each device. In this example, the host at Carmel is 198.12.10.2, and the host at Monterey is 198.12.10.3; but when configuring each device (i.e., bridge) you only enter the IP subnetwork number 198.12.10.0.

To begin the security configuration, press 3 at CFGEDIT's Main Menu. The Security Configuration Menu will then be displayed. The sections below provide instructions for configuring security information.

CONFIGURING THE SECURITY LEVEL

To begin, press 1 at the Security Menu, and the Security Level Menu will be displayed. To enable Device Level Security, press 2.

CONFIGURING THE SYSTEM OPTIONS AND INFORMATION

The default configuration for System Options is all security options enabled, which is acceptable for this network. No System Information or Administration Sessions are required. Therefore, no changes are necessary.

CONFIGURING THE DEVICE LEVEL DATABASES

Press 3 at the Security Menu, and the Device Level Database Menu will be displayed. To enable the On-node Device Database, press 1 and follow the on-screen instructions.

To add the remote devices, press 2 (*On-node Device entries*). Press 1 to configure the information for our first device, Monterey. You will be prompted for the device name, followed by the Device Table Menu:

```
Device Name? Monterey
```

```
Device Table Menu: (Device = "Monterey")

   1)  ISDN
   2)  Frame Relay
   3)  X.25
   4)  Authentication
   5)  IP
   6)  IPX
   7)  AppleTalk
   8)  Bridging
   9)  Compression

Select function from above or <RET> for previous menu: 1
```

Select 1, ISDN. The ISDN Menu will display the preconfigured default values:

```
Device ISDN Menu: (Device = "Monterey")

   1) ISDN Line Protocol        "PPP (Point to Point Protocol)"
   2) Base Data Rate            "64000 bps"
   3) Initial Data Rate         "64000 bps"
   4) Maximum Data Rate         "128000 bps"
   5) Dial Out Phone Number(s)  ""
   6) Subaddress                ""
   7) Profile Name              "Default_Profile"
   8) H0 Call Support           DISABLED

Select function from above or <RET> for previous menu: 1
```

We do not want to use the default ISDN Line Protocol of PPP. Press 1 to configure this device's ISDN line protocol. The device Monterey uses HDLC protocol, so we will press 2:

```
Device ISDN Line Protocol Menu: (Device = "Monterey")
   1) PPP (Point to Point Protocol)
   2) HDLC Bridge
   3) IP Host (RFC1294)
Select option to associate with device "Monterey",
or “0” to disable ISDN access for this device [default = 1]? 2
```

No other changes are required. Return to the Device Table Menu.

Next, we will configure the Bridge Ethernet Address and Password. At the Device Table Menu press 4, *Authentication*. The following screen is displayed:

```
Device Authentication Menu: (Device = "Monterey")

PPP:
   1) PAP Password                ""
   2) CHAP Secret                 ""
   3) Outbound Authentication     ENABLED
   4) User Level Authentication   DISABLED

IP Host (RFC 1294):
   5) IP Host Id                  ""

HDLC Bridge:
   6) Bridge Ethernet Address     ""
   7) Bridge Password             ""

ISDN:
   8) Calling Line Id(s)          ""

Select function from above or <RET> for previous menu:   5
```

Press 6 to specify Bridge Ethernet Address (123123123123); and press 7 to specify Bridge Password (q3bay) at this prompt.

Return to the Device Table Menu and select 5, *IP Routing*. Disable IP routing for this device.

We will configure bridging options next. Return to the Device Table Menu and press 8, *Bridging*:

- Select *IP (Sub-)Network Number*. Respond to the prompt as follows:

```
IP (Sub-) Network Number in dotted decimal notation or NONE [default = NONE]?
198.12.10.0
```

- Select *Bridging*. Enable bridging.
- Leave remaining options disabled. (The *Make Calls*... feature is not supported for RLAN interfaces; the *IPX*... options are not applicable for this example.)

Return to the On-node Device Entries Menu. Configuration is now complete for the device Monterey. Enter the device Carmel in the same way, providing its Bridge Ethernet address and password.

CONFIGURING THE USER LEVEL DATABASES

This network doesn’t require the use of a user level database. Therefore, no changes are necessary.

CONFIGURING THE OFF-NODE SERVER INFORMATION

The default configuration for Off-node Server Information is None (Use On-node). Since this network doesn't require the use of an off-node server, no changes are necessary.

CONFIGURING THE NETWORK LOGIN INFORMATION

This network doesn't require the use of a user level database so network login information configuration is not necessary.

SAVE CONFIGURATION FILES

We have now configured all necessary information. Press 4 from the Main menu to save the changes. The old configuration files will be stored in the `\CONFIG` directory with a file extension of `.BAK` (i.e., the old `NODE.NEI` file will be called `NODE.BAK`).

After you save the configuration files, press <RET> to exit the CFGEDIT program. Reboot the system to activate your changes.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed.

On the CyberSWITCH:

Verify hardware resources are operational
- Issue *dr* command
- Look for BRI line messages
- Look for LAN initialized messages
- Check for IP routing initialized message

Verify WAN Lines Available
- Connect WAN lines
- Issue *dr* command
- Look for "Data Link up 1,1" in reports

On each Remote LAN:

- Attempt to access a resource on the CyberSWITCH LAN. This may require that you reboot your system and proceed through the logon sequence.
- Have the remote hosts ping the CyberSWITCH.
- Have the CyberSWITCH ping the remote hosts (if a connection is up).

IP ROUTING NETWORK WITH PPP DEVICES

OVERVIEW

This sample network uses IP routing to connect two of our products, both using PPP. Each system is on a separate LAN. The configuration for this network is designed to allow three different types of accesses:

- To give Host1 access to resources on LAN2, and to give Host2 access to resources on LAN1.
- To give Host2 access to the Internet which is connected to LAN1.
- To allow Host1 to remotely manage SITE2, and to allow Host2 to remotely manage SITE1.

These accesses are achieved through configuring a combination of interfaces and static routes.

To better understand the layout of this network, refer to the CyberSWITCH Network Topology Worksheet.

This chapter discusses the configuration process for SITE1 and SITE2. Note that the Network Topology and the System Details worksheets are identical for both systems. Each system has unique Routing Information and Device Information worksheets.

INITIAL INSTALLATION STEPS

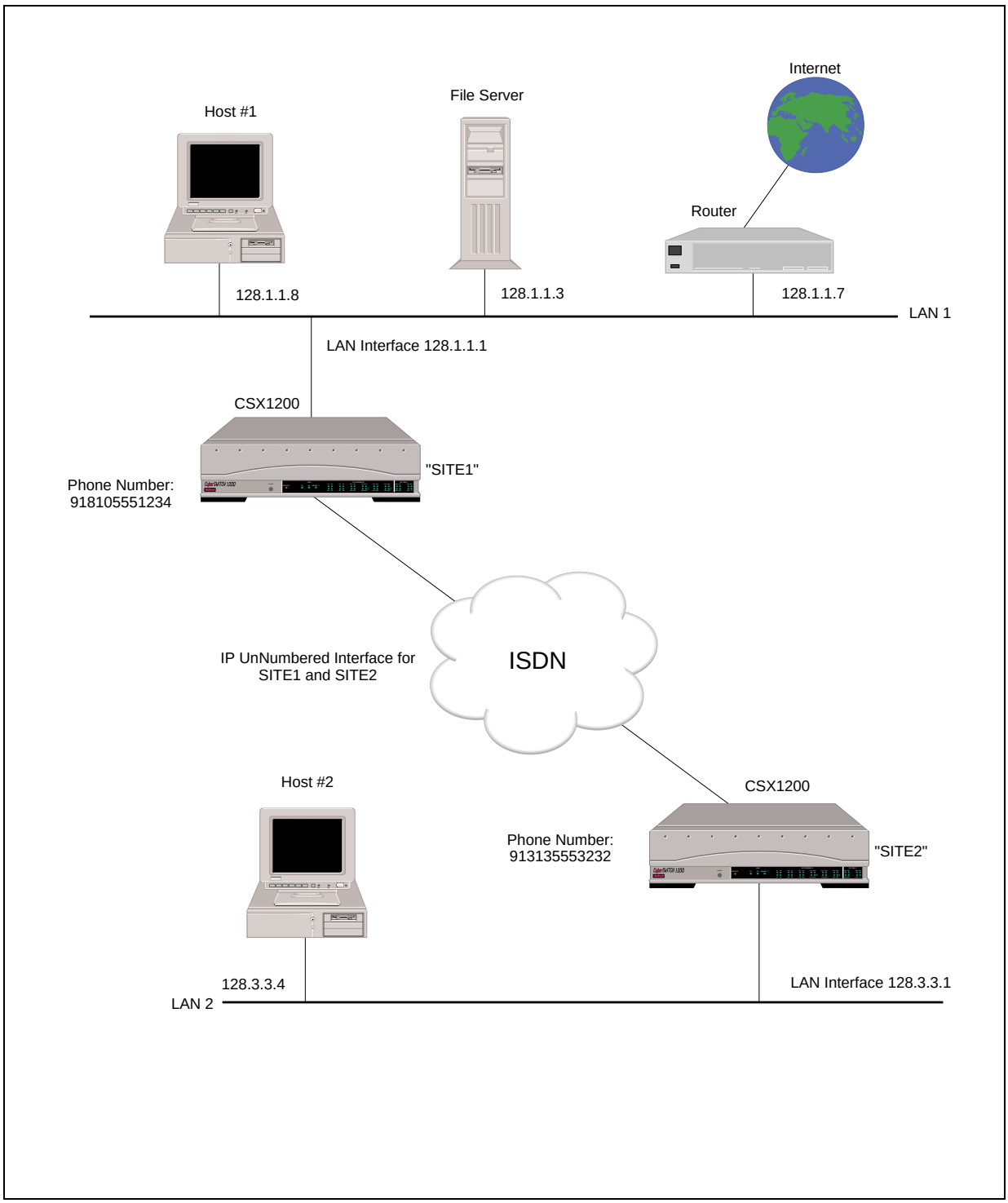
The initial steps in the CyberSWITCH installation process are basically the same no matter how complicated the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe each of these steps in detail.

Worksheets for this network are included on the next few pages.

NETWORK TOPOLOGY



SYSTEM DETAILS

System Name: Site1
Site2

PAP Password:

CHAP Secret: df8sfds33
ikcd98s

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	1	5ESS	
Ethernet_1	2		

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
Line1	1	1			Auto		
Line2	1	2			Auto		
Line3	1	3			Auto		
Line4	1	4			Auto		

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

BRIDGING AND ROUTING INFORMATION

For SITE 1

BRIDGING

Bridging	❒ enabled	***X*** disabled
Mode of Operation	❒ restricted	❒ unrestricted
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	***X*** enabled	❒ disabled
Mode of Operation	***X*** router	❒ IP host

Network Interface Information

LAN	Name	*LAN1*		
	IP address	*128.1.1.1*		
	Mask			
Unnumbered WAN	***X*** need ❒ don't need			
Remote LAN	Name			
	IP address			
	Mask			
Traditional WAN	Name			
	IP address			
	Mask			
Direct Host WAN	Name			
	IP address			
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Destination network address		Mask	Next hop
128.3.0.0	❒ default?	*16*	*0 (SITE2)*
	❒ default?		
	❒ default?		

BRIDGING AND ROUTING INFORMATION

For SITE 2

BRIDGING

Bridging	❒ enabled	***X*** disabled
Mode of Operation	❒ restricted	❒ unrestricted
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	***X*** enabled	❒ disabled
Mode of Operation	***X*** router	❒ IP host

Network Interface Information

LAN	Name	*LAN2*		
	IP address	*128.3.3.1*		
	Mask			
Unnumbered WAN	***X*** need ❒ don't need			
Remote LAN	Name			
	IP address			
	Mask			
Traditional WAN	Name			
	IP address			
	Mask			
Direct Host WAN	Name			
	IP address			
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Destination network address		Mask	Next hop
128.1.0.0	***X*** default?	*16*	*0 (SITE1)*
	❒ default?		
	❒ default?		

DEVICE INFORMATION

For Site 1

Device Name: *Site2*

Calling (ISDN, FR, etc.) Information

Line Protocol	*PPP*
Base Data Rate	*64 Kbps*
Initial Data Rate	*64 Kbps*
Max Data Rate	*384 Kbps*
Dial-Out Number(s)	*913135553232*

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	*ikcd98s*
IP Host ID	
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	***X*** enabled ❒ disabled
IP Address (on WAN link)	*unnumbered* ***X*** 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

For Site 2

Device Name: *Site1*

Calling (ISDN, FR, etc.) Information

Line Protocol	*PPP*
Base Data Rate	*64 Kbps*
Initial Data Rate	*64 Kbps*
Max Data Rate	*384 Kbps*
Dial-Out Number(s)	*918105551234*

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	*df8sfds33*
IP Host ID	
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	***X*** enabled ❒ disabled
IP Address (on WAN link)	*unnumbered* ***X*** 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

CONFIGURE SITE1

Note: The software should have already been installed and the system prompt should be displayed before beginning the configuration.

Using the detailed instructions for these steps found in the *Simple Remote Bridging* chapter, complete the following configuration steps.

Start the CFGEDIT program

Select physical resources
 Select Switch type to be 5ESS
Select to add a line
 Enter the line name
 Select slot and port numbers
 Select line interface type of “Point-to-Point”
 Add Data Links
 Choose Auto TEI Negotiation
 Repeat “Select to add a line” for each additional line

The sections below provide instructions for completing the remaining configuration steps for SITE1 and SITE2.

CONFIGURING THE SYSTEM OPTIONS

To begin the option configuration, press 2 at the Main Menu. The options menu will then be displayed.

For this example, we only need IP routing enabled. The first thing to do: disable bridging. After that, we will need to enable IP routing, and configure all the necessary IP routing information. To disable bridging, press 1 at the Options Menu. Follow the onscreen prompts to disable bridging. Press <return> to return to the Options Menu.

ENABLING THE INTERNET PROTOCOL (IP ROUTING)

To enable IP routing and configure all the necessary IP routing information, press 2 at the Options Menu. The abbreviated IP Configuration Menu will then be displayed.

The next step is to enable the Internet Protocol (IP routing). Press 1, and follow the onscreen instructions for enabling IP routing. The complete IP routing menu will then be displayed.

For this example, the additional IP information we need to configure is IP interfaces and a static route. The next two section will provide the instructions needed to configure this IP information.

CONFIGURING THE IP INTERFACE INFORMATION

In our example, we need to configure two types of interfaces. The LAN interface represents SITE1's connection to the LAN IP Network 128.1.1.1. A WAN UnNumbered interface represents SITE1's logical connection to SITE2. A WAN UnNumbered interface allows you to configure an IP WAN interface without assigning an IP address to it. With this feature, unnecessary logical IP (sub) network numbers for the WAN connections do not have to be created, and therefore saving IP (sub) network numbers.

First we will add the LAN interface. Press 2 to edit the IP Interface Information. Press 1 to add an IP interface. Press 1 to select "LAN" as the type of interface.

The interface name is a symbolic name given to the interface. For the LAN interface, you should use a name that describes the LAN. Enter LAN1 for this example.

You will then be asked for the IP Address for the interface. Enter 128.1.1.1.

For the rest of the entries for this interface, press <return> to accept the default values (including the default values for the LAN RIP information).

The screen interaction will resemble the following:

```
   1) LAN
   2) WAN
   3) WAN (Direct Host)
   4) WAN (RLAN)
   5) WAN (UnNumbered)

Select function from above or <RET> for previous menu: 1

INTERFACE NAME or <RET> to cancel? LAN1

Enter the IP Address in dotted decimal notation
or <RET> to cancel? 128.1.1.1

Enter the number of significant bits for the Subnet Mask
[default = 16]? <RET>

Enter the packet encapsulation type 1) for ETHERNET 2) for SNAP
[default = ETHERNET]? <RET>

Enter the MTU size in bytes [default = 1500]? <RET>

Transmit Broadcast Address:
   1) 128.1.255.255
   2) 128.1.0.0
   3) 255.255.255.255
   4) 0.0.0.0
   5) Specify Explicitly

Enter a Transmit Broadcast Address [default = 1]: 1

RIP Send Control:
   1) Do Not Send.
   2) RIP Version 1.
   3) RIP Version 1 Compatibility.
   4) RIP Version 2.

Enter a RIP Send Control [default = 2]: <RET>

RIP Receive Control:
   1) Do Not Receive.
   2) RIP Version 1 Only.
   3) RIP Version 2 Only.
   4) RIP Version 1 or Version 2.

Enter a RIP Receive Control [default = 4]: <RET>

RIP Respond Control:
   1) Do Not Respond.
   2) RIP Version 1 Only.
   3) RIP Version 2 Only.
   4) RIP Version 1 or Version 2.

Enter a RIP Respond Control [default = 4]: <RET>

RIP Version 2 Authentication Control:
   1) No Authentication.
   2) Simple Password.

Enter a RIP Authentication Control [default = 1]: <RET>
```

After you have entered all of the information for the interface, a summary screen will be displayed. If all of the configured information is accurate, follow the onscreen prompt to save the information.

After you save the LAN interface configuration, press 1 to add the next interface. Configure the information for the WAN (UnNumbered) interface as follows:

```
   1) LAN
   2) WAN
   3) WAN (Direct Host)
   4) WAN (RLAN)
   5) WAN (UnNumbered)

Select function from above or <RET> for previous menu: 5

Enter the MTU size in bytes [default = 1500]? <return>
```

As the above screen shows, not much information is needed to configure a WAN (UnNumbered) interface. Simply press 5 to select the WAN (UnNumbered) interface type, then press <return> to accept the default of 1500 as the MTU size.

After you save the interface information, a screen summarizing the configured interfaces will be displayed.

Normally, at this point, we would configure the necessary static routes. But, because this example uses an UnNumbered Interface, we must first configure the device that will act as SITE1's next hop. We must do this because to add the static route for an UnNumbered interface, you need to enter SITE2's device name for the next hop device. To do this, you must already have configured device SITE2.

Return to the Main Menu to begin the device configuration.

ADDING DEVICE SITE2

Begin by pressing 3 at the Main CFGEDIT Menu. The Security Menu will then be displayed. Then, press 1 at the Security Menu, and the Security Level Menu will be displayed. To enable Device Level Security, press 2.

Press 3 at the Security Menu, and the Device Level Database Menu will be displayed. To enable the On-node Device Database, press 1 and follow the on-screen instructions.

To add the remote devices, press 2 (*On-node Device entries*). Press 1 to add the device. You will first be asked to enter the Device Name as shown below:

```
Device Name? SITE2
```

After the new device name has been specified, the following screen is displayed.

```
Device Table Menu: (Device = "SITE2")

   1)  ISDN
   2)  Frame Relay
   3)  X.25
   4)  Authentication
   5)  IP
   6)  IPX
   7)  AppleTalk
   8)  Bridging
   9)  Compression

Select function from above or <RET> for previous menu:
```

Information for the new device may be configured in any order. You have control over how much information is specified for each device, and the order in which it is entered.

We will begin by specifying the type of device. This device is an ISDN device, so we will press 1 for *ISDN* from the Device Table Menu.

The ISDN Menu will then be displayed with the preconfigured default values as shown below:

```
Device ISDN Menu: (Device = "SITE2")

   1) ISDN Line Protocol       "PPP (Point to Point Protocol)"
   2) Base Data Rate           "64000 bps"
   3) Initial Data Rate        "64000 bps"
   4) Maximum Data Rate        "128000 bps"
   5) Dial Out Phone Number(s) ""
   6) Subaddress               ""
   7) Profile Name             "Default_Profile"
   8) H0 Call Support           DISABLED

Select function from above or <RET> for previous menu?
```

The ISDN Line Protocol default configuration value of “PPP” is what SITE2 uses, so no changes are required for this parameter.

The last three items on the ISDN Menu (initial data rate, maximum data rate, and first dial out number) must be configured for each PPP device SITE1 wants to be able to call.

The default values of the Base Data Rate and the initial data rate are acceptable. No changes are required for these parameters.

We want to change the default maximum data rate for this example. Press 4 to change the maximum data rate. The maximum data rate is used to limit the total number of channels that can be committed to a single logical connection. This sets an upper boundary for line and capacity utilization. This upper boundary allows you to keep one remote device from crowding out other devices and using an unfair share of available resources. This parameter is enforced on inbound and outbound calls. SITE1 will not accept or make a call when the added bandwidth will exceed the configured maximum. The value is configured as a number from 2,400 to 2,048,000. You may configure any value in this range. For example, if you have configured the base data rate at 64 Kbps, and the maximum data rate at 512,000, SITE1 would use a maximum of eight calls (connections) running in parallel to open up bandwidth quickly (512,000 / 64,000 = 8). The value need not be a multiple of the base data rate. For this example, enter 384,000 for the maximum data rate.

Press 5 to enter the first dial out number. A phone number must be defined for each remote device that will be dialed. This number includes any prefix digits, area codes, or extensions as required to dial the destination device. It is possible to specify two phone numbers for the remote device. For this example, we will only be entering one phone number, 913135553232, which is the phone number for SITE2.

After all of the ISDN configuration has been completed, the ISDN Configuration Menu will be displayed as follows:

```
Device ISDN Menu: (Device = "SITE2")

   1) ISDN Line Protocol       "PPP (Point to Point Protocol)"
   2) Base Data Rate           "64000 bps"
   3) Initial Data Rate        "64000 bps"
   4) Maximum Data Rate        "384000 bps"
   5) Dial Out Phone Number(s) "913135553232"
   6) Subaddress               ""
   7) Profile Name             "Default_Profile"
   8) H0 Call Support           DISABLED

Select function from above or <RET> for previous menu?
```

Return to the Device Table Menu.

At the Device Table Menu, press 4 to enter the authentication information needed for this device. The authentication information needed for each device depends on the device type.

For device “SITE2”, because we will be configuring CHAP security, we opt to configure a CHAP secret (ikcd98s). After the secret has been entered, the Device Authentication Configuration Menu will appear as follows:

```
Device Authentication Menu: (Device = "SITE2")

PPP:
   1) PAP Password                ""
   2) CHAP Secret                 "ikcd98s"
   3) Outbound Authentication     ENABLED
   4) User Level Authentication   DISABLED

IP Host (RFC 1294):
   5) IP Host Id                  ""

HDLC Bridge:
   6) Bridge Ethernet Address     ""
   7) Bridge Password             ""

ISDN:
   8) Calling Line Id(s)          ""

Select function from above or <RET> for previous menu:
```

Again, return to the Device Table Menu.

Next, press 5 to enter the IP Information for device SITE2. SITE2 uses an unnumbered link, so we will enter the IP address as 0.0.0.0.

The following screen will be displayed after all information for device SITE2 has been entered:

```
Current Device Table (Sorted by Device Name in Ascending ASCII Order)

id     DEVICE NAME
----------------------------
1      "SITE2"

(1) Add, (2) Change, (3) Delete, (4) Display a Device or press <RET> for previous
menu?
```

Now that device SITE2 has been configured, we can add the needed static route:

- Return to the Main Menu.
- Press 2 to display the Options Menu.
- Press 2 to display the IP Routing Menu.
- Press 3 to add a static route.

CONFIGURING STATIC ROUTES

SITE1 requires one static route. This static route will give SITE1 access to SITE2 and its associated resources. The diagram below illustrates this needed static route, and also the default route needed by SITE2 to gain access to SITE1 and its associated resources.

To begin the static route configuration, press 3 at the IP menu, then press 1 to add a Static Route.

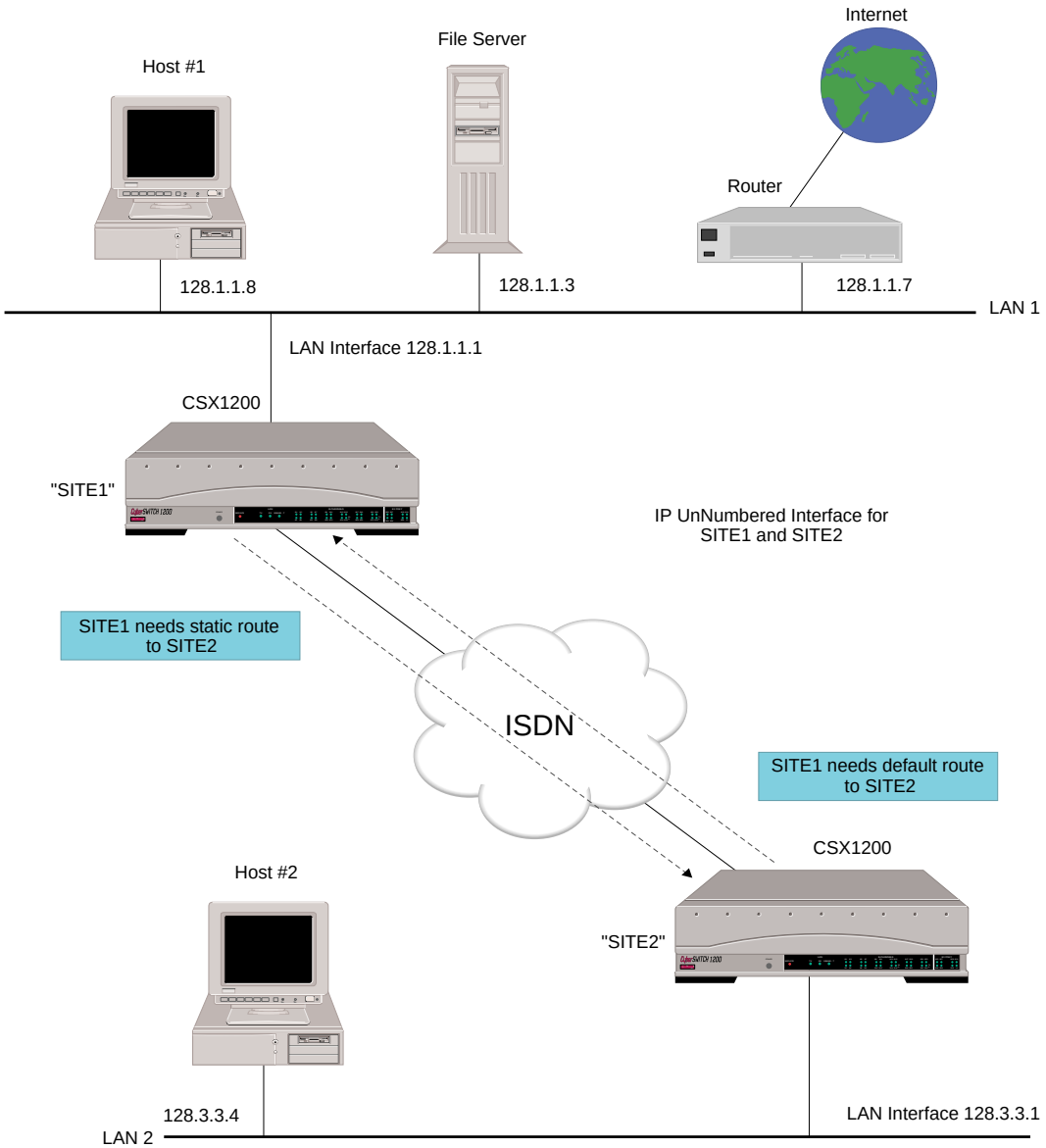
First, you will be asked if the route is the default route. Press N when asked if this is the default route.

Next, enter the destination IP address of the network to which you want to connect. You should enter SITE2's LAN Interface IP address 128.3.0.0.

After you enter the IP address of the LAN, you will be prompted for the Subnet Mask for the address. Press <return> to accept the default of "16" significant bits.

You will then be prompted for the Next Hop device name for the static route. The Next Hop device name names the device that provides access to the network on which SITE2 resides. For this static route, SITE2 is the Next Hop. Because we have configured an IP WAN unnumbered interface for SITE1 and SITE2, SITE2 is an unnumbered link for SITE1. For unnumbered links you should enter 0 for the Next Hop address. This interface will provide the gateway to this network.

When prompted, enter SITE2 as the device name of the next hop device.



We now need to enter the metric value for this route. The metric value is the administrative distance to the destination of the entry. The administrative distance is typically measured by the number of hop counts (number of routers) between the system and the destination, but it is up to you to assign a proper value to each route entry. If multiple routes exist to the same destination, the route with the least metric value will be chosen as its primary route. Care must be taken when assigning the metric value of “0”, because it is interpreted that the destination is reachable directly and therefore no intermediate router will be used. Press <return> to accept the default metric value of 2.

Next, select the RIP Propagation Control. This controls how a static route is propagated via RIP. Press 3 to propagate only when the Next Hop is connected. This flag indicates that the route information is propagated via RIP only when the next hop router is connected to SITE1.

The screen interaction will resemble the following:

```
Is this route the DEFAULT Route (Y or N)? N

Enter the Destination IP Address in dotted decimal notation
 or <RET> to cancel? 128.3.0.0

Enter the number of significant bits for the subnet mask
[default = 16] <RET>

Enter the Next Hop IP Address in dotted decimal notation or '0' if the Next Hop
 is an unnumbered link, or <RET> to cancel? 0

Enter the device name of the Next Hop device
or <RET> to cancel? SITE2

Enter the Metric value for this route [default = 2]? <RET>

RIP Propagation Control:
   1) Do Not Propagate.
   2) Always Propagate.
   3) Propagate only when the Next Hop is connected.

Enter a RIP Propagation Scheme from the above menu [default = 3]? <RET>
```

A summary of the values you have entered for this static route will be displayed. Respond to the prompt asking you if you wish to add this static route. If you add this static route the following screen will then be displayed:

```
Current STATIC ROUTE Configuration:

id Destination Address Mask                 Next Hop             Metric
-- ------------------- ------------------- ------------------- ------
1   128.3.0.0            255.255.0.0          (SITE2)               2

(1) Add, (2) Change, (3) Delete, (4) Display a STATIC ROUTE or press <RET> for previous
menu?
```

SITE1 does not need a static route to the Router on its LAN. This is because SITE1 supports RIP, and the Router supports RIP. RIP is a protocol that exchanges routing information among IP devices. Return to the Main Menu. We now need to complete SITE1's Security configuration.

FINISHING THE SECURITY CONFIGURATION

This example uses device security, and the remote devices are configured in the on-node authentication database. We enabled device security using an on-node authentication database when we configured the SITE2 device.

To complete the security configuration, press 3 at the Main CFGEDIT Menu. The Security Menu will then be displayed. The sections below provide instructions for configuring the remaining security information.

CONFIGURING SYSTEM OPTIONS AND INFORMATION

To configure System Options and Information, press 2 at the Security Menu. By default, all system options are enabled by default, which is acceptable for this network.

Press “2” at the System Options and Information Menu. This is where we will configure the system information for SITE1. Enter SITE1 as the system name, and df8sfds33 as the system secret:

```
System Information Menu:

   1) System Name        is "SITE1"
   2) System Password    is ""
   3) System Secret      is "df8sds33"

Select function from above or <RET> for previous menu?
```

Return to the Main Menu, and save your configuration changes. Reboot SITE1 to activate your changes.

CONFIGURE SITE2

The initial configurations of SITE1 and SITE2 are similar. For the initial configuration of SITE2, duplicate the steps found in the section titled, *Configure SITE1* (page 65).

CONFIGURING SITE2 OPTIONS

For this example, we only need IP routing enabled. Unlike the SITE1, we do not need to enable IP routing for the SITE2. IP routing is enabled as a default for SITE2. We do need to configure IP interface information.

CONFIGURING THE IP INTERFACE INFORMATION

To configure the IP interface information for SITE2, use the same instructions provided for SITE1 (page 66), with the following exceptions:

IP Interfaces for SITE2:

- Configure the LAN Network Interface
 The IP address is 128.3.3.1.

ADDING DEVICE SITE1

Follow the instructions used for configuring device SITE1 (page 68) with the following exceptions:

- Device Name: SITE1
- Dial-Out Phone Number: 918105551234
- CHAP Secret: df8sfds33

CONFIGURING STATIC ROUTES

To configure the static route information for SITE2, refer to the instructions provided for SITE1 (page 71) with the following exceptions:

Static Route for SITE2:
- Enter Y when asked if this static route is a default route.
- Enter SITE1 for the Next Hop name.

CONFIGURING SECURITY

CONFIGURING SYSTEM OPTIONS AND INFORMATION

Follow the instructions used for configuring the system information for SITE1 (page 74) with the following system information exceptions:
- System Name: SITE2
- System Secret: ikcd98s

SAVE CONFIGURATION FILES

We have now configured all the required information for SITE2. Return to the Main Menu, save your configuration files, and exit. Restart the SITE2 to activate the changes.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed for Example 1.

On each system:
- Verify resources are operational
 - Issue *dr* command
 - Look for WAN board initialized messages
 - Look for BRI line messages
 - Look for LAN initialization messages
 - Look for Bridge initialization messages
- Verify WAN Lines Available
 - Connect WAN lines
 - Issue *dr* command
 - Look for "Data Link up 1,1" in reports

On SITE1:
- Check connectivity to local devices
 - IP PING 128.1.1.8 (host)
 - IP PING 128.1.1.3 (server)
 - IP PING 128.1.1.7 (router)
- Check connectivity to SITE2
 - CALL DEVICE SITE2
- Check connectivity to remote devices
 - IP PING 128.3.3.1 (SITE2)
 - IP PING 128.3.3.4 (host)

On SITE2:

- Check connectivity to local devices
 - IP PING 128.3.3.4 (host)
- Check connectivity to SITE1
 - CALL DEVICE SITE1
- Check connectivity to remote devices
 - IP PING 128.1.1.8 (host)
 - IP PING 128.1.1.3 (server)
 - IP PING 128.1.1.7 (router)
 - IP PING 128.1.1.1 (SITE1)

IPX ROUTING NETWORK

OVERVIEW

This sample network uses IPX protocol to allow remote devices and their servers to communicate. It illustrates a master network in which the central-site CyberSWITCH communicates with:

- Remote bridges using a Remote LAN interface, and
- A remote IPX router using a traditional WAN interface.

To better understand the layout of this network, refer to the following Network Topology Worksheet. Note that the central-site master network is in Detroit. Tampa and Orlando represent the bridged sites, and Dallas represents the remote WAN site.

System details appear in the worksheets and are followed by the unique portion of this network's configuration procedure.

BUSINESS ASSUMPTIONS

- All devices are PPP-compliant.
- Central site is on a PBX; therefore, 9 required to dial out.
- No File Servers at Tampa or Orlando sites.
- Uses the On-node Device Database for authentication database.
- Uses PAP to authenticate remotes; CHAP on central site.
- Assumes Dallas Network supports Triggered RIP / SAP (i.e., compatible with central site).
- Central site dials out only to Dallas; Tampa and Orlando dial in to central site.
- Central site supports two BRI lines (4-port BRI card), with 5ESS custom switch configuration.
- Assumes bridging enabled at system level (at central site) so that the device routes enabled network-layer protocols and bridges all other packets.
- Uses no filtering; unrestricted mode.

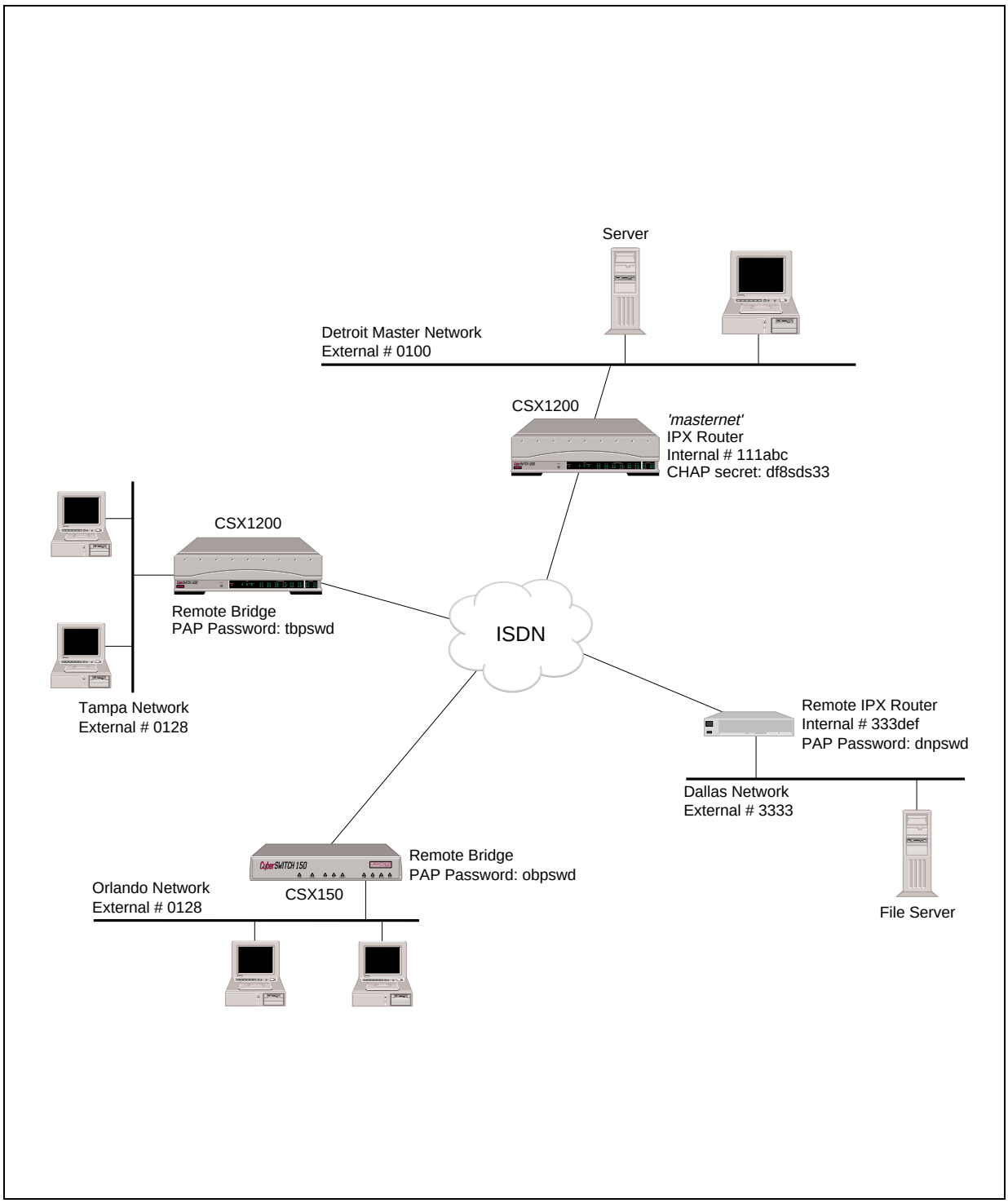
INITIAL INSTALLATION STEPS

The initial steps in the CyberSWITCH installation process are basically the same no matter how detailed the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe each of these steps in detail.

NETWORK TOPOLOGY



SYSTEM DETAILS

System Name: masternet PAP Password:_____ CHAP Secret: df8sds33

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	1	5ESS	
Ethernet-1	3		

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
line1	1	1	PPP		Auto		3137611111
line2	1	2	PPP		Auto		3137612222

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

DEVICE INFORMATION

Device Name: *dallasnet*

Calling (ISDN, FR, etc.) Information

Line Protocol	*PPP*
Base Data Rate	*64000 bps*
Initial Data Rate	*64000 bps*
Max Data Rate	*256000 bps*
Dial-Out Number(s)	*912143339999*

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	*dnpswd*
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

Frame Relay Information

DLCI	

* HDLC Bridge only

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ***X*** disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	❒ enabled ❒ disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	***X*** enabled ❒ disabled
Callable by IPX?	***X*** enabled ❒ disabled
IPXWAN protocol?	***X*** enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ***X*** triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *tampabr*

Calling (ISDN, FR, etc.) Information

Line Protocol	*PPP*
Base Data Rate	*64000 bps*
Initial Data Rate	*64000 bps*
Max Data Rate	*128000 bps*
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	*tbpswd*
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

Frame Relay Information

DLCI	

* HDLC Bridge only

Protocol for this particular device?

Bridge

Bridging enabled?	***X*** enabled ❒ disabled
Make calls for bridged data?	❒ enabled ***X*** disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	*0128*

IP

IP enabled?	❒ enabled ❒ disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ***X*** disabled
Callable by IPX?	❒ enabled ***X*** disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

DEVICE INFORMATION

Device Name: *orlandobr*

Calling (ISDN, FR, etc.) Information

Line Protocol	*PPP*
Base Data Rate	*64000 bps*
Initial Data Rate	*64000 bps*
Max Data Rate	*128000 bps*
Dial-Out Number(s)	

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	*obpswd*
CHAP Secret	
IP Host ID	
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

Frame Relay Information

DLCI	

* HDLC Bridge only

Protocol for this particular device?

Bridge

Bridging enabled?	***X*** enabled ❒ disabled
Make calls for bridged data?	❒ enabled ***X*** disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	*0128*

IP

IP enabled?	❒ enabled ❒ disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ***X*** disabled
Callable by IPX?	❒ enabled ***X*** disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	❒ enabled ❒ disabled
AppleTalk Address	
Make calls for AT data?	❒ enabled ❒ disabled
AT Routing Protocol	

BRIDGING AND ROUTING INFORMATION

BRIDGING

Bridging	***X*** enabled	❒ disabled
Mode of Operation	❒ restricted	***X*** unrestricted
Bridge Filters		
Bridge Dial Out/ Known Connect List		

IP ROUTING

IP Routing	❒ enabled	❒ disabled
Mode of Operation	❒ router	❒ IP host

Network Interface Information

LAN	Name			
	IP address			
	Mask			
Unnumbered WAN	❒ need ❒ don't need			
Remote LAN	Name			
	IP address			
	Mask			
Traditional WAN	Name			
	IP address			
	Mask			
Direct Host WAN	Name			
	IP address			
	Mask			
IP Host Mode	IP address			
	Mask			

Static Routes

Network type to site to be accessed	Mask	Next hop
Destination network range		
Next hop address		
Next hop device name		
❒ default?		

IPX ROUTING

IPX Routing Information

IPX routing	***X*** enabled	❒ disabled	
Internal network number			*111abc*

Network Interface Information

LAN name	External network number	Remote LAN name	External network number
detroitlan	*0100*	*remotelan*	*0128*

IPX Static Routes

Destination network number	Next hop
❒ Int. ❒ Ext.	
❒ Int. ❒ Ext.	
❒ Int. ❒ Ext.	
❒ Int. ❒ Ext.	
❒ Int. ❒ Ext.	
❒ Int. ❒ Ext.	

NetWare Static Services

Server name	Type	Internal network number	Node number	Socket number

CONFIGURE IPX ROUTING: MASTERNET (DETROIT)

Using the detailed instructions provided in the *Simple Remote Bridging* chapter, use the CFGEDIT program to configure *Resources* and *Lines* for the Detroit Master Network (*masternet*).

When complete, continue with the unique configuration elements for this IPX example. These include:

- configuring appropriate devices,
- configuring a Remote LAN Interface for the Orlando and Tampa sites, and
- configuring RIP and SAP to communicate with the Dallas router

CONFIGURE DEVICES

First, we need to identify the devices to which *masternet* will connect. We need to configure an IPX WAN device for the Dallas site, and we need to configure Remote LAN devices for the Tampa and Orlando sites.

ADD IPX WAN DEVICE

Press 3 at the Security Menu, and the Device Level Database Menu will be displayed. To enable the On-node Device Database, press 1 and follow the on-screen instructions.

To add the remote devices, press 2 (*On-node Device entries*). Press 1 to configure the information for our first device, dallasnet. You will be prompted for the device name, followed by the Device Table Menu:

```
Device Name? dallasnet
```

After the new device name has been specified, a screen similar to the following is displayed.

```
Device Table Menu: (Device = "dallasnet")

   1)  ISDN
   2)  Frame Relay
   3)  X.25
   4)  Authentication
   5)  IP
   6)  IPX
   7)  AppleTalk
   8)  Bridging
   9)  Compression

Select function from above or <RET> for previous menu:
```

This menu provides various configuration options for the device *dallasnet*. For purposes of our example, we will provide the following *ISDN* and *Authentication* information.

ISDN Information

From the Device Table Menu, select *ISDN*.

Accept the ISDN Line Protocol default value of PPP, as well as the default values for Base Data Rate and Initial Data Rate. However, increase the *Maximum Data Rate* to 256,000 (to use a maximum of

four calls / connections running in parallel). Configure a *dial-out number* for the Dallas site, which is: 912143339999. We will not use the remaining parameters (subaddress, profile name or HO support) for this example. Return to the Device ISDN menu (following), and then return to the Device Table Menu:

```
Device ISDN Menu: (Device = "dallasnet")

   1) ISDN Line Protocol        "PPP (Point to Point Protocol)"
   2) Base Data Rate            "64000 bps"
   3) Initial Data Rate         "64000 bps"
   4) Maximum Data Rate         "256000 bps"
   5) Dial Out Phone Number(s)  "912143339999"
   6) Subaddress                ""
   7) Profile Name              "Default_Profile"
   8) H0 Call Support           DISABLED

Select function from above or <RET> for previous menu:  <RET>
```

Authentication Information

From the Device Table Menu, select *Authentication*. Add the Dallas site's PAP password, which is *dnpswd*.

IPX Information

From the Device Table Menu, select *IPX*. From this configuration menu, insure that *IPX routing* and *Make calls for IPX data* are enabled. You may then enable IPXWAN protocol:

```
Device IPX Menu:  (Device = "dallasnet")

   1) IPX Routing               ENABLED
   2) Make calls for IPX data   ENABLED
   3) IPXWAN Protocol           DISABLED
   4) Routing Protocol          None
   5) Spoofing Options

Select function from above or <RET> for previous menu?3

Use the IPXWAN protocol for this device (Y or N)  [default = N] ? Y
```

Next, select *Routing Protocol*. For this example, we will use the triggered RIP / SAP protocol, and select a WAN Peer Type of *ACTIVE*:

```
IPX Device Routing Protocol

1)     None
2)     RIP/SAP
3)     Triggered RIP/SAP

Enter selection or press <RET> for previous menu [default=None}: 3

1)     Active
2)     Passive

Triggered RIP/SAP WAN Peer type [default=ACTIVE]:  1
```

Finally, there is no need to change the default *Spoofing Options*. Return to the Device Table Menu.

ADD REMOTE LAN DEVICES

From the *On-node Device Entries Menu*, select *Add*. Enter the device name for the Tampa site, which is *tampabr*. Select *Authentication*, and add the Tampa site's PAP password, which is *tbpswd*. Accept defaults for *ISDN* and *IPX information*.

From the Device Table Menu, select *Bridging*. Enter the *IPX Remote LAN Network Number* of 0128, which is the external network number of the Remote LAN at the Tampa site. Be sure *make calls* field is disabled, since Remote LAN does not as yet support this feature.

Note: In our example, we could have also accepted the default option for the IPX Network Number, *NONE*, since the remote LAN has no servers locally attached to it. In this case, the Remote LAN's network address would default to 0128, the external network number we will configure for the Remote LAN interface. For more details, refer to the *Configuring IPX* chapter, *Network Interface Background Information*.

The bridging options for *tampabr* should now look like the following:

```
Device Bridge Menu:  (Device = "tampabr")

   1) IP (Sub)Network Number             NONE
   2) Bridging                           ENABLED
   3) Make calls for bridge data         DISABLED
   4) IPX Remote LAN Network Number      0128
   5) IPX Spoofing Options
   6) AppleTalk Network Number

Enter selection or press <RET> for previous menu:
```

The configuration of device *tampabr* is complete. Return to the On-node Device Entries Menu, and add the device ***orlandobr*** in a similar fashion. After devices tampabr and orlandobr have been configured, return to the Main Menu.

CONFIGURE SYSTEM OPTIONS

Next, we must configure bridging and routing information, which falls under the *Options* category. To begin its configuration, press 2 at the Main Menu. For this example, we will enable bridging, enable IPX routing, and configure the necessary IPX routing information.

ENABLE BRIDGING

1. Select *Options* from the Main Menu.
2. Select *Bridging*.
3. Follow screen prompts to insure that bridging is enabled (to support Remote LAN).

ENABLE IPX ROUTING

1. Select *Options* from the Main Menu.

2. Select *IPX Routing.*

3. Enable IPX Routing. Press any key to display the complete IPX routing menu:

```
IPX Menu:

   1)  IPX Routing (Enable/Disable)
   2)  IPX Internal Network Number
   3)  IPX Interfaces
   4)  Routing Protocols(Enable/Disable)
   5)  IPX Static Routes
   6)  NetWare Static Services
   7)  IPX Spoofing
   8)  Type 20 Protocol
   9)  Isolated Mode (Enable/Disable)
   10) Triggered RIP/SAP

Select function from above or <RET> for previous menu:
```

DEFINE AN INTERNAL NETWORK NUMBER

1. From the *IPX* menu, select *IPX Internal Network Number.*

2. Enter the Network Number as prompted. For our example, we will assign the Detroit IPX router *masternet* a unique internal network number of *111abc.*

IPX INTERFACE INFORMATION

In our example, we have three interfaces:

- the LAN interface, which represents the CyberSWITCH connection to the LAN IPX Network 0100
- the Remote LAN interface for connecting to the bridges at Tampa and Orlando
- the traditional WAN interface for connecting to the router at Dallas

CyberSWITCH systems do not require you to configure traditional WAN interfaces for IPX routing, so no additional interface configuration is needed for the Dallas network. However, you must configure both the LAN interface and the Remote LAN interface (for access to Tampa and Orlando). The configurations of both of these interfaces are described in the following sections.

Add a LAN Interface

First we will add the LAN interface. From the *IPX Menu*, select *IPX Interfaces.* Select *Add.* Select *LAN* as the type of interface.

The interface name is a symbolic name given to the interface. For the LAN interface, you should use a name that describes the LAN. Enter *detroitlan* for this example.

You will then be asked for the IPX external network number for the LAN interface. Enter 0100.

For the rest of the prompts, press <RET> to accept the default values (including the default values for the LAN RIP information).

Add a Remote LAN Interface

After completing the LAN interface configuration, select *Add* to add the next interface for the Remote LAN. Configure the information for the WAN (Remote LAN) interface as follows:

```
   1) LAN
   2) WAN (Remote LAN)

Select function from above or <RET> for previous menu: 2

INTERFACE NAME or <RET> to cancel  ?   remotelan

Enter the hexadecimal IPX Network Number or <RET> to cancel  ?  0128

Enter the packet encapsulation type
   1) Ethernet_II
   2) Ethernet_802.2
   3) Ethernet_802.3
   4) Ethernet_SNAP

[default = ETHERNET_802.2]   ?   2

Enter the MTU size in bytes [default = 1497]? <RET>
```

Note that the *IPX Network Number* in the above screen refers to the external network number of the Remote LAN (i.e., the bridged sites).

The following menus will be presented if the IPX RIP/SAP protocols are enabled for the system. For Remote LANs, the remote peer (bridge) is not expected to understand RIP/SAP protocols. In the event that the remote peer does understand these protocols, we suggest the following configuration: *do not send*, *receive*, and *respond*. This will allow the remote peer to see NetWare services when the remote bridge is connected. When not connected, the services will age-out and eventually go away.

The RIP/SAP menus will appear similar to the following:

```
RIP Send Control:
   1) Do Not Send.
   2) Send.

Enter a RIP Send Control from the above menu [default = 2]? 1

RIP Receive Control:
   1) Do Not Receive.
   2) Send.

Enter a RIP Receive Control from the above menu [default = 2]? 2

RIP Respond Control:
   1) Do Not Respond.
   2) Send.

Enter a RIP Respond Control from the above menu [default = 2]? 2
```

```
SAP Send Control:
   1) Do Not Send.
   2) Send.

Enter a SAP Send Control from the above menu [default = 2]? 1

SAP Receive Control:
   1) Do Not Receive.
   2) Send.

Enter a SAP Receive Control from the above menu [default = 2]? 2

SAP Respond Control:
   1) Do Not Respond.
   2) Send.

Enter a SAP Respond Control from the above menu [default = 2]? 2
```

Finally, you'll see this screen:

```
Current Configuration for INTERFACE "remotelan":

Interface Type               WAN (Remote LAN)
IPX Network Number           0128
MTU (bytes)                  1497
Encapsulation                Ethernet 802.2
RIP Configuration:
  Send Control          Do Not Send
  Send Frequency        60 seconds
  Receive Control       Receive
  RIP entry aging time  180 seconds
  Respond Control       Respond

SAP Configuration:
  Send Control          Do Not Send
  Send Frequency        60 seconds
  Receive Control       Receive
  SAP entry aging time  180 seconds
  Respond Control       Respond

Are you sure you want to add the INTERFACE "remotelan" (Y or N) ?  <Y>
```

When you've completed the configuration of both interfaces, you'll see a summary screen similar to the following:

```
IPX INTERFACE Menu:

id      Name           Type                    Address
1       detroitlan     LAN                     0100
2       remotelan      WAN (Remote LAN)        0128


(1) Add,  (2) Change,  (3) Delete, (4) Display an INTERFACE
or <RET> for previous menu:   <RET>
```

IPX STATIC ROUTES

Assuming the router at Dallas supports triggered RIP over the WAN, it is not necessary to configure static routes. For our example, we will skip this configurable option.

If *dallasnet* did not support triggered RIP, you would then need to configure the appropriate static routes. You would follow the on-screen prompts, remembering that routes to both internal and external networks must usually be configured.

CONFIGURE NETWARE STATIC SERVICES

Assuming the router at Dallas supports triggered SAP over the WAN, it is not necessary to configure static services. For our example, we will skip this configurable option.

Similarly, configure static services if *dallasnet* did not support triggered SAP.

ROUTING PROTOCOLS

To allow the sending of triggered RIP / SAP traffic back and forth to the Dallas site, we need to enable the RIP / SAP routing protocols. From the *IPX Menu*, select *Routing Protocols (Enable/Disable).* Based upon the display, insure that both RIP processing and SAP processing are enabled. Follow the on-screen instructions to make any necessary changes.

Note that you may also specify the size of table entries. For our example, we will skip this configuration since we will accept the default values for these options.

IPX SPOOFING

To avoid excessive ISDN connections, the CyberSWITCH uses spoofing and automatic filtering techniques. Both IPX and SPX Watchdog spoofing are enabled by default. For purposes of our example, we will keep these default settings.

TYPE 20 PROTOCOL

This option pertains to certain protocol implementations such as NetBIOS. Since this implementation is not applicable to our example, we will leave this feature disabled.

ISOLATED MODE

Since this implementation is not applicable to our example, we will leave this feature disabled.

TRIGGERED RIP/SAP

From the *IPX* menu, select *IPX Triggered RIP/SAP*. From the resulting screen, you may display WAN peer list information, or change the global RIP / SAP timer configuration. View the WAN peer list to assure that *dallasnet* is properly listed. Skip past the global timer configuration, since we will accept the default values for this option.

SAVE CONFIGURATION FILES

We have now configured all the required information for *masternet*, the IPX router in Detroit. Return to the Main Menu, save your configuration files, and exit. Restart the IPX router to activate the changes.

CONFIGURE THE REMOTE DEVICES

Configure the remote devices in a similar manner as the *masternet* configuration:

- Keep in mind that the Tampa and Orlando sites are bridges. Be sure to enable bridging, and configure each one to dial-in to *masternet*.
- Configure the Dallas site as an IPX router. Verify that it supports Triggered RIP / SAP. Enable and configure IPX routing, and add *masternet* as *dallasnet*'s device.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed.

On each system:

- Verify resources are operational
 - Issue `dr` command
 - Look for WAN board initialized messages
 - Look for BRI line messages
 - Look for LAN initialization messages
 - Look for Bridge initialization messages
- Verify WAN Lines Available
 - Connect WAN lines
 - Issue `dr` command
 - Look for "Data Link up 1,1" in reports

Once call connectivity is verified, verify the routing configurations:

On *masternet* IPX router:

- Issue `IPX service` command to display its SAP table.
 - Has the CyberSWITCH learned about local servers?
 - Can it ping them (`IPX ping` internal network #)?
 - Has it learned about servers in Dallas?
- Issue `IPX route` command.
 - Has *masternet* learned a route to Dallas network?
 - Can *masternet* ping a server on the Dallas network?
 - Can clients in Dallas automatically generate a call and login successfully to server in Detroit?
 - Can clients in Detroit automatically generate a call and login successfully to servers in Dallas?
- Can remote bridges at Tampa and Orlando dial-in to *masternet*?
 - Can clients on their LANs attach and login to servers on *masternet*?
 - Do their attempts to login to masternet automatically generate a call?

APPLETALK ROUTING NETWORK

OVERVIEW

This chapter provides an example configuration of an AppleTalk Routing network. Our AppleTalk network is made up of two LANs, separated by the WAN. The MACs on each side of the WAN need to exchange packets with the MACs on the other side of the WAN. Both LANs also have a CyberSWITCH (SITE1 and SITE2). When configured for AppleTalk routing, SITE1 and SITE2 will provide the access the MACs need.

This chapter describes the AppleTalk configuration process for a CyberSWITCH. We will walk you through the configuration for SITE1. Because the instructions would be similar, we do not describe SITE2's configuration.

For further network layout clarification, refer to the AppleTalk Routing Topology Worksheet.

INITIAL INSTALLATION STEPS

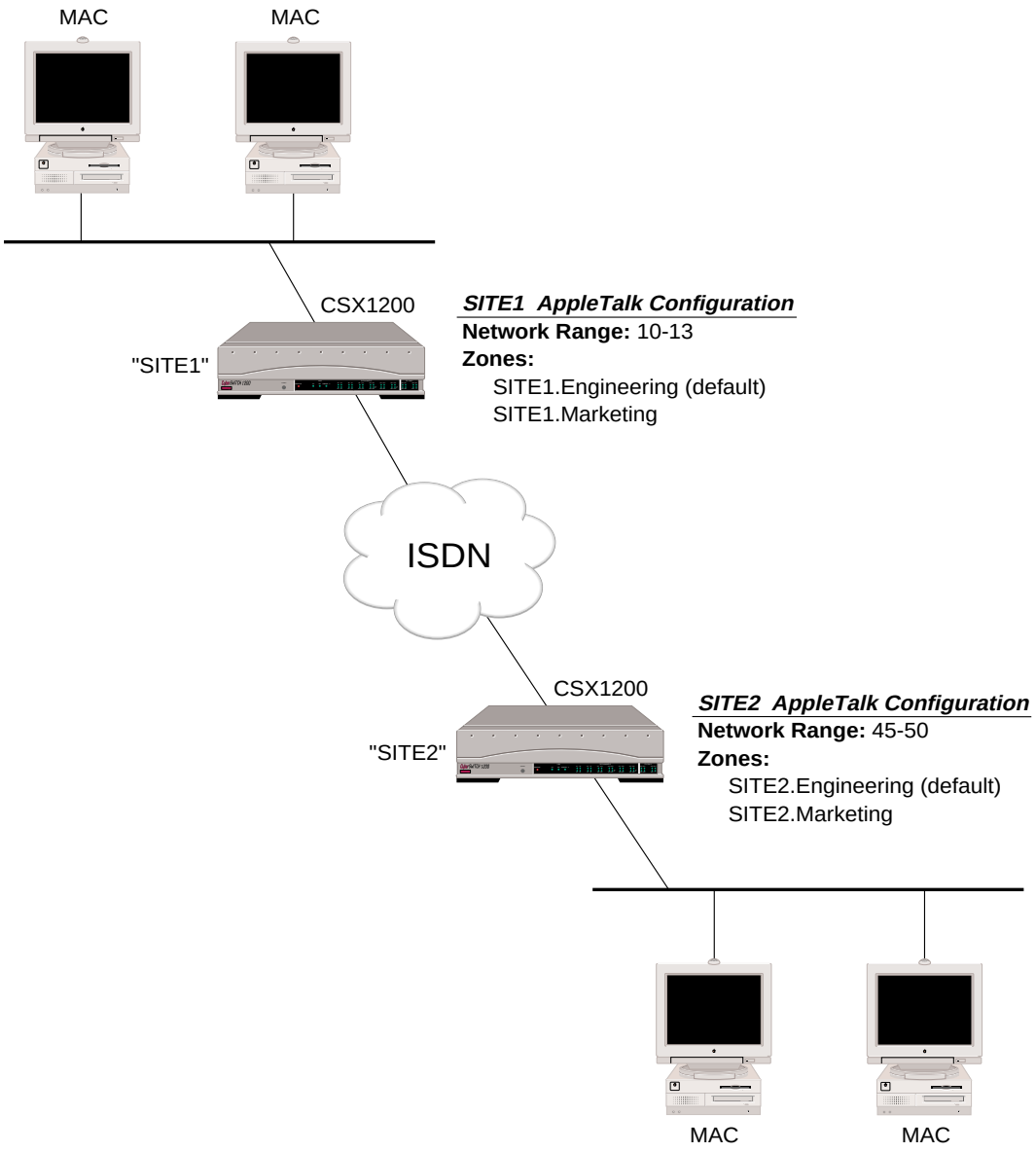
The initial steps in the CyberSWITCH installation process are basically the same no matter how complicated the network. These steps are:

- completing the requirement worksheets
- ordering ISDN service
- powering on the system
- accessing Release Notes
- connecting an administration console
- setting up Telnet access
- upgrading system software
- changing defaults to secure system
- returning configuration to factory defaults

The chapters *Accessing the CyberSWITCH* and *Upgrading System Software* (in the *User's Guide)* describe these steps in detail.

Worksheets for this network are included on the next few pages.

NETWORK TOPOLOGY



SYSTEM DETAILS

System Name: ___*SITE1*___ PAP Password:_____ CHAP Secret: _____

RESOURCES

Type	Slot	Switch type	Synchronization type
BRI	*1*	*NI-1*	*N/A*
Ethernet-1	*2*	*N/A*	*N/A*

LINES

BRI Lines

Name	Slot	Port	Line type	Call screen	TEI	SPID	Directory number
Line1	*1*	*1*			*Auto*	*3135551111*	*13135551111**
						3135551112	*13135551112**
Line2	*1*	*2*			*Auto*	*3135551113*	*13135551113**
						3135551114	*13135551114**

* *Hunt Group Number: 13135551111*

PRI Lines

Name	Slot	Port	Framing type	Line coding	Sig. method	Line build-out

APPLETALK ROUTING

AppleTalk Routing/Port Information

AppleTalk routing	***X*** enabled	❒ disabled		
LAN	Name	*lanport1*		
	Port number	*1*		
	Network type	***X*** extended ❒ nonextended		
	Netwk range/ number	*10-13*		
	AppleTalk address	*(none)*		
	Zone name(s)	*site1.eng*	*site1.mark*	
WAN	Name			
	Network type	❒ extended ❒ nonextended	❒ extended ❒ nonextended	❒ extended ❒ nonextended
	Netwk range/ number			
	AppleTalk address			
	Zone name(s)			
Unnumbered WAN	***X*** need ❒ don't need			
MAC Dial In WAN	Network type	❒ extended ❒ nonextended	❒ extended ❒ nonextended	❒ extended ❒ nonextended
	Netwk range/ number			
	AppleTalk address			
	Zone name(s)			

AppleTalk Port Static Routes

Network type to be accessed	Destination network range	Next hop address	Next hop name	Number hops	Zone name(s)
X extended ❒ nonextended	*45-50*	*0.0*	*Site2*	*1*	*site2.eng*
❒ extended ❒ nonextended					
❒ extended ❒ nonextended					

DEVICE INFORMATION

Device Name: *SITE2*

Calling (ISDN, FR, etc.) Information

Line Protocol	*PPP*
Base Data Rate	*64000 bps*
Initial Data Rate	*64000 bps*
Max Data Rate	*384000 bps*
Dial-Out Number(s)	*913135553232*

X.25 Information

PVC	
SVC	

Authentication Information:

PAP Password	
CHAP Secret	*hcaz*
IP Host ID	
Bridge Ethernet Address*	
Bridge Password*	
CLID(s)	

* HDLC Bridge only

Frame Relay Information

DLCI	

Protocol for this particular device?

Bridge

Bridging enabled?	❒ enabled ❒ disabled
Make calls for bridged data?	❒ enabled ❒ disabled
For IP RLAN, IP (Sub-) network number	
For IPX RLAN, external network number	

IP

IP enabled?	❒ enabled ❒ disabled
IP Address (on WAN link)	❒ 0.0.0.0 if unnumbered link
Make calls for IP data?	❒ enabled ❒ disabled

IPX

IPX enabled?	❒ enabled ❒ disabled
Callable by IPX?	❒ enabled ❒ disabled
IPXWAN protocol?	❒ enabled ❒ disabled
IPX routing protocol?	❒ none ❒ RIP/SAP ❒ triggered RIP/SAP
IPX spoofing?	

AppleTalk

AppleTalk enabled?	***X*** enabled ❒ disabled
AppleTalk Address	*0.0*
Make calls for AT data?	***X*** enabled ❒ disabled
AT Routing Protocol	*none*

CONFIGURE THE CYBERSWITCH

Note: The software should have already been installed and you need the system prompt before proceeding with these steps.

Using the detailed instructions for these steps found in the *Simple Remote Bridging* chapter, complete the following configuration steps for SITE1.

Start the CFGEDIT program

Select physical resources
Select to add a resource
 Select Switch type to be NI-1
Select to add a line
 Enter the line name
 Select slot and port numbers
 Select line interface type of "Point-to-Point"
 Add Data Links (Data Link explanation follows)
 Choose Auto TEI Negotiation
 Enter Service Profile ID (SPID) Value
 Enter Directory Number for Data Link
 Enter Maximum Number of Digits to Verify
 Repeat "Add Data Links" for second Data Link
 Repeat "Select to add a line" for each additional line

Data links are handled differently on a NI-1 switch. Some BRI lines have only one phone number (for the Data Link), but can handle two calls (one for each bearer channel). For NI-1 switches, the BRI line has two phone numbers (one for each bearer channel), and each phone number has its own SPID. You must enter the number of digits to verify, so that when the system receives a phone call it can determine on which bearer to accept the phone call. Refer to the System Details worksheet for the SPIDs, directory numbers, and the number of digits to verify.

The sections below provide instructions for completing the remaining configuration steps for SITE1.

CONFIGURING THE OPTIONS

By default, AppleTalk Routing is disabled. Before we can begin configuring the AppleTalk feature, we must first enable AppleTalk Routing. From the Options Menu, select *AppleTalk Routing (Enable/Disable)*. Follow the onscreen instructions to enable AppleTalk Routing. The following expanded screen will then be displayed:

```
AppleTalk Routing Menu:

   1) AppleTalk Routing (Enable/Disable)
   2) AppleTalk Ports
   3) AppleTalk Static Routes
   4) Isolated Mode (Enable/Disable)

Select function from above or <RET> for previous menu:
```

We will use this menu to configure SITE1's AppleTalk information.

CONFIGURING APPLETALK PORT INFORMATION

For this example, we need to configure both a LAN and a WAN UnNumbered AppleTalk port. The LAN AppleTalk port represents SITE1's connection to its LAN AppleTalk network, allowing SITE1 to exchange packets with the two MACs on the LAN. The WAN UnNumbered port creates a logical AppleTalk network over WAN that uses unnumbered point-to-point links, allowing SITE1 to exchange packets with SITE2.

We will begin with configuring the LAN AppleTalk port. Select *AppleTalk Ports* from the AppleTalk Routing Menu. Then, *press 1* to add a port. You will then be prompted for port information as shown below:

```
AppleTalk Port Type:
   1) LAN
   2) WAN
   3) WAN (UnNumbered)
   4) WAN (Mac Dial In)

Enter a port type from the above menu or <RET> to cancel? 1

Enter the port name or <RET> to cancel ?  lanport1

Enter the LAN port number or <RET> to cancel?  1

AppleTalk Network Type:
   1) Extended Network
   2) NonExtended Network

Enter a network type from the above menu or <RET> to cancel? 1

Enter the AppleTalk network range. Use 0-0 to place the port into
discovery mode or <RET> to cancel? 10-13

Enter the suggested AppleTalk address [default = None] ? <RET>

Enter the default zone name or <RET> to cancel ? SITE1.Engineering
```

Use the following information to clarify each of the port information entries:

- port type:
 Press 1 to select the *LAN* port type (this indicates that the system is physically connected to an Ethernet LAN segment.

- port name:
 The port name is a 1 to 16 character device-defined string that will identify the LAN port to the system administrator. Enter *lanport1* for the port name.

- port number:
 Enter 1 for the port number of the AppleTalk LAN port. This is the port number on the Ethernet resource to which the physical LAN is connected.

- AppleTalk network type:
 Choices are: extended or nonextended network. The extended network allows addressing of *more than* 254 nodes and supports *multiple* zones, whereas the nonextended network allows *up to* 254 nodes and supports *only one* zone.This network requires a range of network numbers and multiple zones. Select the *extended* network type.

- AppleTalk network range:
 This range specifies the AppleTalk network range of the LAN segment that the port is connected to. As indicated by the topology worksheet, the network range for SITE1's LAN is *10-13*.

 Note: If we wanted SITE1 to be in discovery mode, we could have entered a range of 0-0. In the discovery mode, the system is a non-seed router, learning about its network from a seed router. Each network must have at least one seed router. Entering a network range for SITE1's LAN port designates SITE1 as a seed router.

- suggested AppleTalk address
 We want to select the default (*none)*. This means that an unused AppleTalk address will transparently be assigned to the LAN port. If desired, you can *suggest* an AppleTalk address you would like to use for the port. When an address is *suggested*, that address will be used *if*, after a probe is done, it is known that no other device is using that address.

- default zone name
 By assigning multiple zone names, you can logically group nodes on an internet. Each name can be configured to represent a logical group within that respective internet. As indicated on the topology worksheet, SITE1 uses two zones: Engineering and Marketing.

 Enter *SITE1.Engineering* as the default zone name, then press 1 to add *SITE1.Marketing* as the second zone. The following screen will then be displayed:

```
Current Zones for PORT "lanport1":

Id  Zone name
--  --------------------------------
 1  Site1.Engineering (default)
 2  Site1.Marketing

(1) Add, (2) Change, (3) Delete a Zone
 or <RET> for previous menu ? <RET>
```

Note: No zone configuration menu is presented for ports in discovery mode.

The LAN AppleTalk port information is now complete. To configure the WAN UnNumbered port simply *press 1* to add a port, then select the WAN UnNumbered port type.

Normally, at this point, we would configure the necessary static routes. But, we can not configure a static route until we configure device SITE2. This is because a static route using an UnNumbered port requires a device name for the route's next hop device. You can not enter a device name of a device that has not been configured. Device information is configured under the Security Menu. Return to the main CFGEDIT menu.

CONFIGURING DEVICE INFORMATION

Select *Security* from the Main CFGEDIT Menu. The Security Menu will then be displayed as follows:

```
Security Menu:

   1) Security Level
   2) System Options and Information
   3) Device Level Databases
   4) User Level Databases (Enable/Disable)
   5) Off-node Server Information
   6) Network Login Information

Select function from above or <RET> for previous menu: 1
```

We need to configure device information for our remote device, SITE2. Remote devices are configured in the on-node authentication database.

After selecting *Device Level Database(s)* from the Security menu shown above, the following Device Level Database Menu will be displayed.

```
Device Level Database Menu:

   1) On-node Device Database (Enable/Disable)
   2) On-node Device Entries
   3) Off-node Device Database Location

Select function from above or <RET> for previous menu: 1
```

Select *On-node Device Entries* from the above menu, then select to add a device. Enter *SITE2* as the device name. The following screen will then be displayed.

```
Device Table Menu: (Device = "SITE2")

   1)  ISDN
   2)  Frame Relay
   3)  X.25
   4)  Authentication
   5)  IP
   6)  IPX
   7)  AppleTalk
   8)  Bridging
   9)  Compression

Select function from above or <RET> for previous menu: 1
```

The three areas of information we must configure for device SITE2 are *ISDN*, *Authentication*, and *AppleTalk*. The following sections will help you configure each of these three areas for device SITE2.

CONFIGURING DEVICE SITE2'S ISDN INFORMATION

We will begin by specifying the type of device. This device is an ISDN device, so we will select *ISDN* from the Device Table Menu.

The ISDN Menu will then be displayed with preconfigured default values as shown below:

```
Device ISDN Menu: (Device = "SITE2")

   1) ISDN Line Protocol       "PPP (Point to Point Protocol)"
   2) Base Data Rate           "64000 bps"
   3) Initial Data Rate        "64000 bps"
   4) Maximum Data Rate        "128000 bps"
   5) Dial Out Phone Number(s) ""
   6) Subaddress               ""
   7) Profile Name             "Default_Profile"
   8) H0 Call Support           DISABLED

Select function from above or <RET> for previous menu:
```

The ISDN Line Protocol default configuration value of "PPP" is what SITE2 uses, so no changes are required for this parameter.

The base data rate, initial data rate, maximum data rate, and first dial out number must be configured for each PPP device SITE1 wants to be able to call out to. The default values of the base data rate and the initial data rate are acceptable. No changes are required for these parameters.

We do want to change the default maximum data rate for this example. The maximum data rate is used to limit the total number of channels that can be committed to a single logical connection. This sets an upper boundary for line and capacity utilization. This upper boundary allows you to keep one remote device from crowding out other devices and using an unfair share of available resources. This parameter is enforced on inbound and outbound calls. SITE1 will not accept or make a call when the added bandwidth will exceed the configured maximum. The value is configured as a number from 2,400 to 2,048,000. You may configure any value in this range. For example, if you have configured the base data rate at 64 Kbps, and the maximum data rate at 512,000, SITE1 would use a maximum of eight calls (connections) running in parallel to open up bandwidth quickly (512,000 / 64,000 = 8). The value need not be a multiple of the base data rate. For this example, enter *384,000* for the maximum data rate.

We also need to enter a phone number for each remote device that will be dialed. This number includes any prefix digits, area codes, or extensions as required to dial the destination device. It is possible to specify more than one phone number for the remote device. For this example, we will only be entering one phone number, *913135553232*, which is the phone number for SITE2.

After all of the ISDN configuration has been completed, the ISDN Configuration Menu will be displayed as shown below:

```
Device ISDN Menu: (Device = "SITE2")

   1) ISDN Line Protocol.      "PPP (Point to Point Protocol)"
   2) Base Data Rate.          "64000 bps"
   3) Initial Data Rate.       "64000 bps"
   4) Maximum Data Rate.       "384000 bps"
   5) Dial Out Phone Number(s)."913135553232"
   6) Subaddress.              ""
   7) Profile Name.            "Default_Profile"
   8) H0 Call Support.          DISABLED

Select function from above or <RET> for previous menu:
```

Return to the Device Table Menu to begin SITE2's authentication configuration.

CONFIGURING DEVICE SITE2'S AUTHENTICATION INFORMATION

At the Device Table Menu, select *Authentication*. You may then enter the authentication information needed for this device. The information needed for each device depends on the device type.

For device SITE2, because we will be configuring CHAP security, we will configure a CHAP secret (ikcd98s). After the secret has been entered, the Device Authentication Menu will appear as follows:

```
Device Authentication Menu: (Device = "SITE2")

PPP:
   1) PAP Password                ""
   2) CHAP Secret                 "ikcd98s"
   3) Outbound Authentication     ENABLED
   4) User Level Authentication   DISABLED

IP Host (RFC 1294):
   5) IP Host Id                  ""

HDLC Bridge:
   6) Bridge Ethernet Address     ""
   7) Bridge Password             ""

ISDN:
   8) Calling Line Id(s)          ""

Select function from above or <RET> for previous menu:
```

Again, return to the Device Table Menu.

CONFIGURING DEVICE SITE2'S APPLETALK INFORMATION

To begin the configuration of device SITE2's AppleTalk information, select *AppleTalk* from the Device Table menu. A menu will then be displayed with preconfigured default values. as shown below:

```
Device AppleTalk Menu:  (Device = "SITE2")

   1) AppleTalk Address               None
   2) AppleTalk Routing               DISABLED
   3) Make calls for AppleTalk data   DISABLED
   4) AppleTalk Routing Protocol      None

Select function from above or <RET> for previous menu:
```

To complete the AppleTalk configuration for device SITE2:

- Select *AppleTalk Address*. Because this device is over an unnumbered link, enter *0.0* for the AppleTalk address.
- Select *AppleTalk Routing*. Follow the on-screen instructions to enable AppleTalk routing for SITE2.
- Select *Make calls for AppleTalk Data*. Follow the on-screen instructions to enable making calls for AppleTalk data.

After the device's AppleTalk information has been entered, the menu will appear as follows:

```
Device AppleTalk Configuration Menu:  (Device = "SITE2")

   1) AppleTalk Address               0.0
   2) AppleTalk Routing               ENABLED
   3) Make calls for AppleTalk data   ENABLED
   4) AppleTalk Routing Protocol      None

Select function from above or <RET> for previous menu:
```

We will now continue with the AppleTalk Routing configuration. Return to the main AppleTalk Routing Menu.

CONFIGURING AN APPLETALK STATIC ROUTE

SITE1 requires one static route. This static route will give SITE1 access to SITE2 and its associated resources.

To add the static route, select *AppleTalk Static Routes* from the main AppleTalk Routing Menu. Then, *press 1* to add a static route. You will then be prompted for static route information as shown below:

```
AppleTalk Network Type:
   1) Extended Network
   2) NonExtended Network

Enter a network type from the above menu or <RET> to cancel? 1

Enter the destination network range or <RET> to cancel? 45-50

Enter the AppleTalk address of the next hop device. Enter "0.0" if the next hop
is over an unnumbered link or <RET> to cancel?  0.0

Enter the device name of the next hop device
 or <RET> to cancel? SITE2

Enter the number of hops for this route or <RET> to cancel?  1

Enter the default zone name or <RET> to cancel? SITE2.Engineering
```

Use the following information to clarify each of the static route information entries:

- AppleTalk network type:
 This is SITE2's network type.

- destination network range
 This is the destination network range assigned to SITE2's LAN segment. As indicated on the topology worksheet, SITE2's network range is *45-50*.

- next hop's AppleTalk address
 The next hop is the device that provides access to the network across the WAN. In this case, SITE2 will provide access to the network across the WAN for SITE1. Because we are using an unnumbered link, *enter 0.0* for SITE2's AppleTalk address.

- next hop's device name
 Whenever you enter 0.0 for the next hop address, you are then required to enter the next hop's device name. Enter *SITE2*.

- number of hops
 This is the number of devices between the device you are configuring and the network across the WAN. In this case, there is one site, SITE2, between SITE1 and the network across the WAN. Enter *1* for the number of hops.

- default zone name
 To enter the zone names associated with SITE2's LAN segment, first enter *SITE2.Engineering* as the default zone name, then add *SITE2.Marketing* as a second zone name.

Return to the main CFGEDIT menu.

SAVE CONFIGURATION FILES

We have now configured all required information for this example. Select *Save Changes* from the main CFGEDIT menu. Follow the on-screen instructions to save any configuration changes made. The old configuration files will be stored in the \CONFIG directory with a file extension of .BAK (e.g., the old NODE.NEI file will be called NODE.BAK).

After saving the configuration files, *press* <*RET*> to exit the CFGEDIT program. Reboot the system to activate your changes.

VERIFY THE INSTALLATION

Steps on how to verify the installation are detailed in the *System Verification* chapter of the *User's Guide*. This section gives an outline of which steps should be executed.

On the CyberSWITCH:
- Verify hardware resources are operational
 - Issue *dr* command
 - Look for BRI line messages
 - Look for LAN initialized messages
- Verify WAN Lines Available
 - Connect WAN lines
 - Issue *dr* command
 - Look for "Data Link up 1,1" in reports

On each AppleTalk LAN:
- Attempt accessing a resource on the CyberSWITCH LAN. This may require that you reboot your system and proceed through the logon sequence.

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